REPORT RESUMES

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PREPARING AGRICULTURAL TECHNICIANS, REPORT OF A NATIONAL SEMINAR ON AGRICULTURAL EDUCATION (OHIO STATE UNIVERSITY, JULY 20-24, 1964).

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OVER 100 STATE AND NATIONAL LEADERS IN AGRICULTURAL EDUCATION, VOCATIONAL EDUCATION, AND TECHNICAL EDUCATION MET TO CONSIDER THEIR RESPONSIBILITIES FOR PROVIDING LEADERSHIP IN THE DEVELOPMENT AND EXPANSION OF PROGRAMS FOR PREPARING AGRICULTURAL TECHNICIANS. MAJOR SPEECHES ARE PRESENTED -- "THE PROBLEM - THE SETTING - THE PLANS FOR PREPARING AGRICULTURAL TECHNICIANS," "WHAT IS A TECHNICIAN," "AGRICULTURAL TECHNICIAN TRAINING POSSIBILITIES AND RESPONSIBILITIES," "GUIDELINES FOR THE DEVELOPMENT OF TRAINING PROGRAMS FOR AGRICULTURAL TECHNICIANS," "THE LABOURERS ARE FEW," "DETERMINING NEEDS FOR AGRICULTURAL TECHNICIANS," "A GUIDE FOR CURRICULUM DEVELOPMENT FOR EDUCATING AGRICULTURAL TECHNICIANS," "EDUCATION OF HIGHLY SKILLED AGRICULTURAL TECHNICIANS," "STUDENT SERVICES FOR AGRICULTURAL TECHNICIAN PROGRAMS," "FACILITIES AND EQUIPMENT FOR AGRICULTURAL TECHNICIAN PROGRAMS," AND "AGRICULTURAL TECHNICIAN PROGRAMS AND THE FARM EQUIPMENT INDUSTRY." REPORTS OF PANEL DISCUSSIONS AND TASK FORCES ARE GIVEN. (EM)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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REPORT
OF
A NATIONAL SEMINAR ON AGRICULTURAL EDUCATION
"PREPARING AGRICULTURAL TECHNICIANS"

The National Center for Advanced Study and Research
in Agricultural Education
July 20 to 24, 1964

The Ohio State University
Columbus, Ohio

ACKNOWLEDGEMENT

The National Center gratefully acknowledges a grant from The Sears-Roebuck Foundation to underwrite the expenses of this seminar.

PREFACE

Over one hundred state and national leaders in agricultural education and vocational and technical education, representing thirty-eight states, the District of Columbia, and Guam, met at the National Center, July 20 to 24, 1964, to focus on their responsibilities for providing leadership in the development and expansion of programs for preparing agricultural technicians. This seminar was developed to devote attention to one of the significant changes in the structure of our nation's work force--the rapid development of occupations which are between the skilled worker and the professional.

The technological explosion in agriculture and the rapid expansion of the off-farm segment of the agricultural industry have brought about an increasing need for these semi-professional workers, commonly called technicians. Other factors which contribute to the urgent need for development of adequate technician training programs and which also place increased emphasis on the importance of this seminar are:

1. One of the key features of the 1963 Vocational Education Act is its emphasis on serving all age groups. We are challenged to serve the "no man's land" between high school and the baccalaureate degree.

2. Agricultural occupation studies being conducted in the various states are revealing an increasing need for agricultural technician training programs.

3. Many states are developing the needed educational organizational structure for providing agricultural technician training programs, such as area vocational schools, technical institutes, and community colleges.

4. The current needs of the labor market demand quality vocational education. Agricultural technician programs provide the means for adequately developing needed depth of know-how and know-why.

Since funds will be available under the Vocational Education Act of 1963 for agricultural technician programs, it is obvious that state staff members--supervisors, teacher educators, and other leaders in vocational and technical education--will have definite responsibilities and opportunities for leadership in this area, irrespective of the institutional setting in which such programs are offered.

The primary purpose of the seminar was to assist these leaders in identifying and clarifying their role in the initiation, conduct, and evaluation of agricultural technician programs. As the seminar progressed, it became increasingly apparent that the development of programs for preparing agricultural technicians would necessitate effective working relationships with a wide range of agencies, groups, and institutions.

For a more detailed over-view of the seminar purposes and the setting in which these purposes were implemented, the reader is referred to the presentation, "The Problem - The Setting - The Plans for Preparing Agricultural Technicians," page 9.

In retrospect, the seminar meetings were characterized by a positive, stimulating spirit of free inquiry. Traditional practices and concepts were questioned and re-evaluated in light of present or future circumstances. The seminar did not attempt to develop policies or to establish definite guidelines for the development of technician training programs in specific institutional settings, but rather examined ways and means in which such programs could flourish in a variety of institutional settings.

One of the major difficulties in reporting a meeting of this type is trying to capture the "spirit of the meeting" and the many other benefits accruing from such an activity. The following presentations of the consultant staff and the task force reports constitute the major thoughts emanating from the seminar discussions. They should be read and interpreted with an understanding of the framework and limitations under which they were developed. They should not be looked upon as final, but rather as developmental as they contribute to the reader's understanding of preparing agricultural technicians.

As would be expected in meetings of this nature, the major benefits were derived by the participants as they shared ideas, raised questions, acquired new insights, and broadened and extended their concepts and understandings. Admittedly, this report cannot and does not contain all of the values emanating from such interactions. However, we believe the interest and enthusiasm kindled during these sessions will spark new interests and examination of the problems associated with preparing agricultural technicians in the states and institutional settings represented by the participants.

As seminar director, I would like to express my appreciation to the participants for the enthusiasm and cooperation they manifested throughout the seminar. Acknowledgement is also due the consultant staff who through their participation, dedication, and forward-looking and thought-provoking presentations added an immeasurable dimension to the seminar deliberations. Robert M. Knoebel, Director of the Technical Education Branch in the U. S. Office of Education, and Jerry J. Halterman, Instructor of Agricultural Engineering at Modesto Junior College, California, also merit our thanks for their splendid work as special consultants during the seminar.

Finally, the entire agricultural education profession and the National Center, in particular, acknowledge their gratitude to the SEARS-ROEBUCK FOUNDATION for underwriting the expenses of the seminar.

If this seminar is the first of a series of state, regional, and national meetings, conferences, and research studies designed to expand and improve agricultural technician training throughout the nation, it will have fulfilled its purpose. Admittedly, much remains to be done. However, we believe some firm foundations have been laid.

Robert E. Taylor
Director

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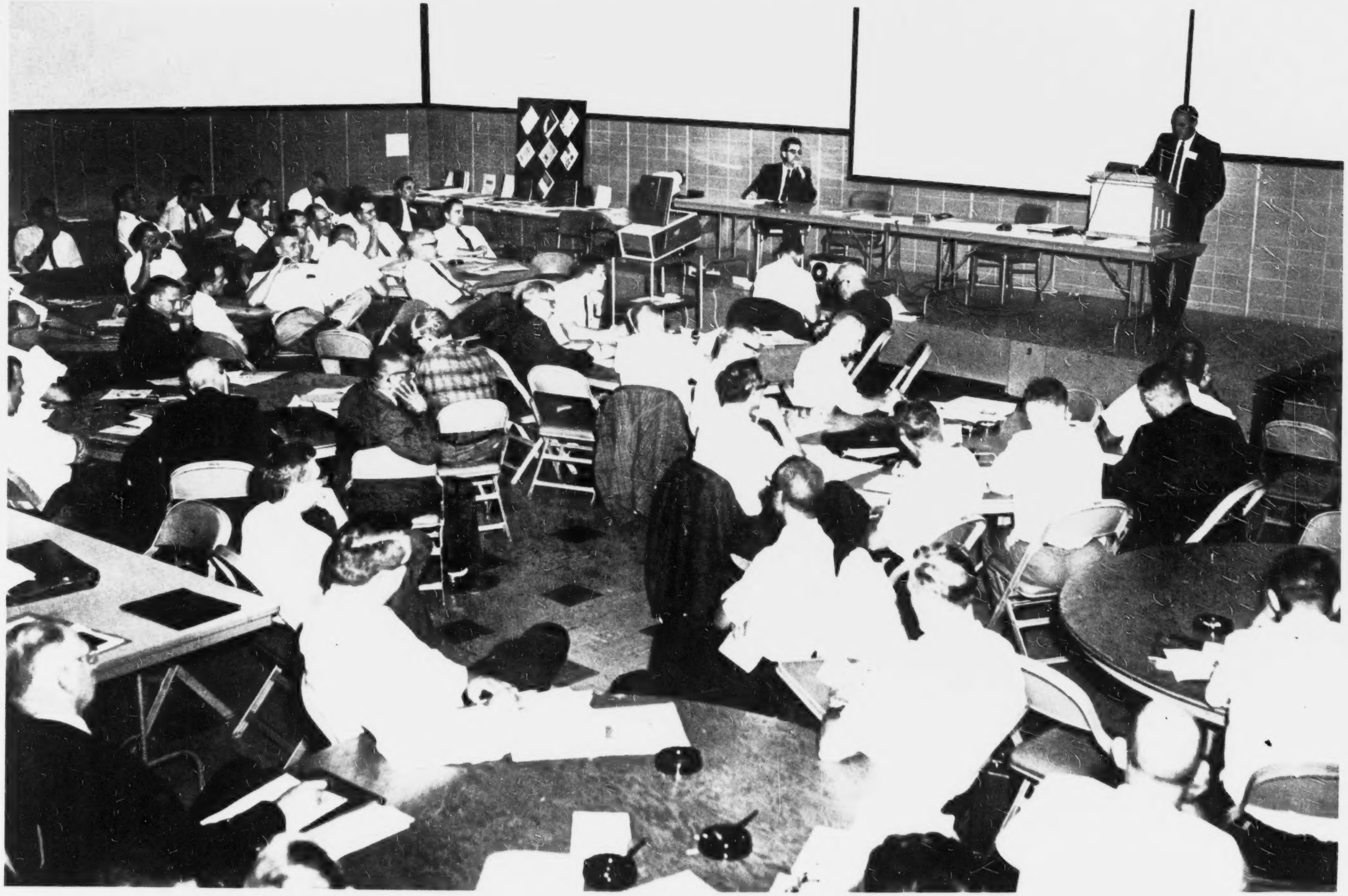

An outstanding group of national consultants made presentations during the seminar. Here G. A. Sherman, Dean of Agriculture, Mt. San Antonio Junior College, California, is addressing the group on "Determining Curricular Content for Agricultural Technician Programs." Presentations of consultants were followed by "table talk," questioning, and task force discussions.

PART I

SEMINAR GUIDELINES

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THE PROBLEM - THE SETTING - THE PLANS FOR PREPARING AGRICULTURAL TECHNICIANS

by

Robert E. Taylor
Director, National Center
for Advanced Study and Research
in Agricultural Education

We are delighted that you are here to participate in and contribute to this National Seminar. I believe the presence of over 100 busy, responsible state and national leaders in agricultural education from 38 states is ample and dramatic evidence of the importance and cruciality of the seminar theme. Providing an adequate and effective corps of agricultural technicians is the urgent task which confronts us. Most assuredly, it will require the resources, the best thinking, and the cooperation of all groups represented here if we are to succeed.

It would seem desirable to review briefly some of the dynamics of the present situation which relate to our immediate and challenging task.

First, in terms of the broad setting, we see new thrusts and emerging trends. For example:

1. The increased complexity of every-day life in a society shifting from a primarily rural to an urban, industrialized one.
2. The tremendous impact of increased technical and scientific knowledge.
3. The new role of education in our society, standing between man and his job, which recognizes that the lack of education is a barrier between men and jobs.
4. The dramatic increase in sophistication and complexity of occupations at all levels.
5. The virtual disappearance of unskilled, common labor jobs.
6. The impact of automation and the flow-process industries on production, on jobs, and on people.
7. The aspirations within a free society which leave no person content to stay in his place.
8. The realization that knowledge is the key to a better life, not just for a few but for many.
9. The belief that only the educated are free and its implication, then, that all of the free must be educated to the maximum of their capabilities.
10. The wide range of needs for semi-professional manpower.
11. The manpower shortage in professional and technical categories, contrasted with devastating unemployment in the unskilled and semi-skilled categories.
12. The realization that a "disaster gap" is opening up between those of our citizens with advanced education and those with little education.
13. The urgent need for millions of citizens who can both think and do -- and the gradual disappearance of a bi-polar society in which an elite few did all the thinking and the rest did all the work.

Shifting our view from the broad societal setting and focusing primarily on the complex field of agriculture -- production, processing, marketing, and servicing -- we note the following trends:

1. The technological explosion in agriculture -
   Increased private and governmental investments in agricultural research have resulted in a literal explosion of knowledge.

2. Increased applications of science to agriculture and the recognition of the biophysical scientific base of agricultural technology -

3. Increased mechanization and the application of the systems concept to agriculture -
   These have reduced unskilled labor and increased the need for highly skilled workers.

4. Increased capitalization per worker -
   This is evidence of and permits further technological advancement and development in both on-farm and off-farm phases (input - output) of agriculture.

These and related developments have contributed to significant changes and adjustments in agriculture and agricultural education. We see, for example:

1. An escalation of the competencies required by agricultural workers. Job skills are increasing. There is a premium on "know-why" as well as "know-how". The cognitive demands of a job are equal to or sometimes supersede the manipulative aspects of the job. We see the need for occupational skills being undergirded by a sound general education base.

2. Standards for agricultural college degree programs are advancing.

3. A widening gap appears to be developing between high school vocational courses and baccalaureate degree programs. This has been referred to as a no-man's-land by various agricultural education leaders.

4. There is developing an increased demand for middle-manpower, para-professional workers, technicians if you please. This need is not restricted to the domestic scene but also is evident as we examine our nation's commitments and responsibilities to developing countries.

There appears little doubt but that we need an increased supply of agricultural technicians. For example, industry has for a number of years identified certain ratios between the number of professional workers and the number of technicians needed to support them. These ratios range from 1:1 to 1:5 and perhaps higher. On some of the space shots from Cape Kennedy the ratio of scientists to technicians was 1:3.

What should it be in agriculture? How many agricultural technicians are needed? In 1963 there were 6,128 baccalaureate degrees in agricultural areas conferred by land-grant colleges. If we assume only a 1:1 ratio between professionals and technicians, we see a need for over 6,000 agricultural technicians annually. How many agricultural technicians are we training? Probably no one really knows. Estimates indicate the number to be less than 500 per year. I ask you--how serious is this gap?

What would an adequate supply of skilled, competent, agricultural technicians mean to the agricultural industry and the nation? What appear to be some of the obvious advantages and benefits from an expanded program of agricultural technician training? Following are some of the more obvious values of an expanded program in this area:

1. It should provide the means of making more effective use of our professional agriculturalists, freeing them in many instances from sub-professional tasks for truly professional level work.

2. It should permit four-year agricultural degree programs to attain the depth and level of excellence demanded by modern agricultural technology by focusing primarily on professional preparation, and to concentrate chiefly on becoming the scientific base, the fountainhead, of knowledge in agriculture.

3. It should bring into balance the manpower structure of agriculture, help it become pyramidal rather than hour-glass in shape, and allow us to more effectively utilize our human resources in agriculture.

4. ?

This list should be concluded with a question mark because I am sure you will readily think of other values and benefits from an expanded and improved agricultural technician training program.

We should also mention that the values of and need for expanding technical education were recognized by Congress in its passage of the National Vocational Education Act of 1963. Funds will soon be available. The needs are evident. The situation demands leadership action on the part of state staffs and others to initiate new programs and to improve and expand existing programs.

To summarize to this point, the "climate" in which we meet is good. There never was a better time or greater urgency for improving and extending agricultural technician programs.

I have been told by my friends in distributive education that part of good salesmanship is knowing when to quit selling and when to let the customer buy. I suspect you already are more aware of the need for improving our capacity in this vital area than am I. That's why you are here. In a sense, you have already bought.

Now, where do we go from here? How do we plan to proceed, to maximize the individual and group benefits from our week together?

First, the major underlying purpose of this seminar is to assist state and national leaders in agricultural education in identifying and clarifying their leadership role in initiating, improving, and extending agricultural technician programs. In fulfilling this global purpose, a number of specific areas have been identified for discussion to aid us in thinking through some of the problems and alternatives. These major areas are:

Needs for training programs
Objectives
Curricular content
Student services
Staffing
Plant facilities and equipment
Financing
Relationships to other agencies and groups

Through the seminar we hope to fulfill our underlying purpose and develop greater understandings and competencies in the problem areas. Furthermore, we would hope that this seminar will give greater visibility to the needs and opportunities in technical education in agriculture and that this area of our professional responsibility will receive increased attention and prominence in other meetings and activities of agricultural educators.

There will be three types of involvement for you as a participant:

1. As a member of the total seminar;
2. As a round-table discussion group member.
3. As a member of a task force.

Working together, how will we proceed to get the job done? What are some of the "ground rules" or operational procedures that we will follow?

First, I would like to emphasize that neither the Center nor the seminar staff has a "package" that we are trying to unload. We do not profess to have "answers" to current problems in technician training. We do not have a fixed position, but rather an attitude--an attitude

- that we have made a splendid beginning in technician training but that it can be better;
- that because of increased needs our efforts should be expanded;
- that the leadership for these adjustments and extensions may well come from members of this seminar;
- that together, this week, we should be able to develop concepts and understandings that will assist us in moving ahead.

Furthermore, we believe that learning is an active process, that this week should be a growth experience for all of us, and that this will most likely happen through active participation by everyone.

To assure maximum benefits from the seminar to you individually, to the state or institution you represent, and to the profession, we encourage, we want, yes, even require your best participation and thinking. Everyone's ideas are important regardless of position. Irrespective of the size of your state program, whether or not you have previously been involved in technician training, your years of experience notwithstanding, we want your ideas and questions. Hopefully, we will have active participants, not passive observers.

Before we begin the seminar it seems appropriate to examine our resources. In any discussion of available resources for a seminar of this type it is essential to think of the participants themselves as the most valuable resource. You representatives of 38 states, in yourselves, constitute a valuable and rich resource. Your knowledge and experiences, coupled with the contributions of our consultant staff and provided with a stimulating atmosphere, cannot help but contribute to our group progress.

Remember that the "bull sessions" during coffee breaks, in the dormitories, and at other times will provide additional opportunities for an important exchange of ideas on a wide range of topics.

During the seminar we will have an opportunity to hear presentations from a number of leaders in agricultural education, vocational education, and related fields. I am sure that you will find their contributions especially helpful.

I particularly want to reemphasize the opportunity and obligation you have to raise questions with these people, questions which contribute to our deliberations here and apply to problems back home. The members of the consulting staff will, in most instances, be available for further questioning during our task force efforts. They have been asked to project their thinking, to make specific suggestions for moving ahead in their particular areas of technical education, to do some "frontier thinking" if you please. A copy of their presentations will be a part of the seminar report which will be sent to each participant.

A large number of other sources of assistance exists on the campus in terms of staff personnel and University libraries. Feel free to utilize them fully.

I especially want to call your attention to three major premises upon which this seminar is structured:

1. We believe that this is not a policy or action group. It is a study group. The outcomes of the seminar will be guides to individuals and states who are free to accept or reject the suggestions as they deem appropriate. Furthermore, I would hope that we will be operating in a spirit of openmindedness, in a free and permissive climate that will permit honest expressions and differences of opinion; that we will set our sights high in terms of quality and standards, focusing on what ought to be rather than merely perpetuating or protecting what we have. I would hope that we will think in terms of "we", not "I", and of what is good for agriculture and the people we serve.

2. We believe that technical education in agriculture can thrive in a variety of institutional settings; that technical training can be effective in community colleges, technical institutes, area vocational schools, four-year colleges, and universities. It is not our purpose here to prove that one setting is better than the other or that only one type of institution should be given this responsibility. This is for each state to decide. Rather, our concern here is how we work together to make technical education in agriculture more effective in any of these institutional settings.

3. We believe that agricultural technician training is not the only type of post-high-school occupational training in agriculture that is needed. It does not supplant young farmer, adult farmer, or other full-time but less extensive vocational offerings. Neither does it minimize the need for professional level preparation.

These are the three major premises that we have followed in planning this seminar. I hope that they will provide the philosophical structure and freedoms needed to make our deliberations effective.

While it may be premature to suggest specific follow-ups for this meeting, it does seem timely to at least hurriedly overview some of these possibilities:

1. Report on this seminar to your fellow staff members upon your return. Also report to your national professional groups.
2. Review the implications of this seminar for your state, identify priorities, determine responsibilities, and provide leadership in improving and expanding agricultural technician training.
3. Consider conducting a state seminar on preparing agricultural technicians, involving appropriate agricultural and educational leaders.
4. Plan to participate in future Center programs (possible follow-up activities to this seminar).
5. Provide a feed-back to the Center. Keep us posted on developments, activities, and progress in implementing some of the seminar outcomes. Give us suggestions as to how the Center can continue to assist this development.

In summary, we have the prospects of a stimulating and rewarding experience during the next week. The essential ingredients are here. We have an urgent task, common concerns, a rich background of experiences, an outstanding consultant staff, a favorable climate, and, we hope, an appropriate setting for effective group effort here at the Center. Let's make the most of it.

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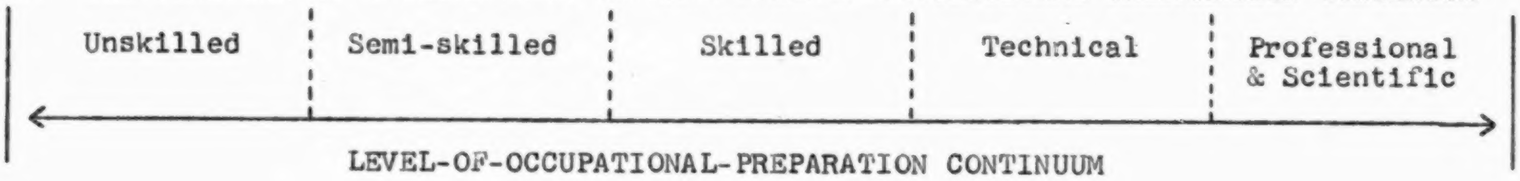
THE AGRICULTURAL TECHNICIAN

The following definition of an agricultural technician was developed during the seminar. An attempt was made to define this worker in terms of (1) the position on a level-of-occupational-preparation continuum, (2) the kind, amount, and level of educational preparation required in a specific occupational field, and (3) the characteristic kinds of activities performed on the job which reflect the level of competency and proficiency required by the worker for successful job performance.

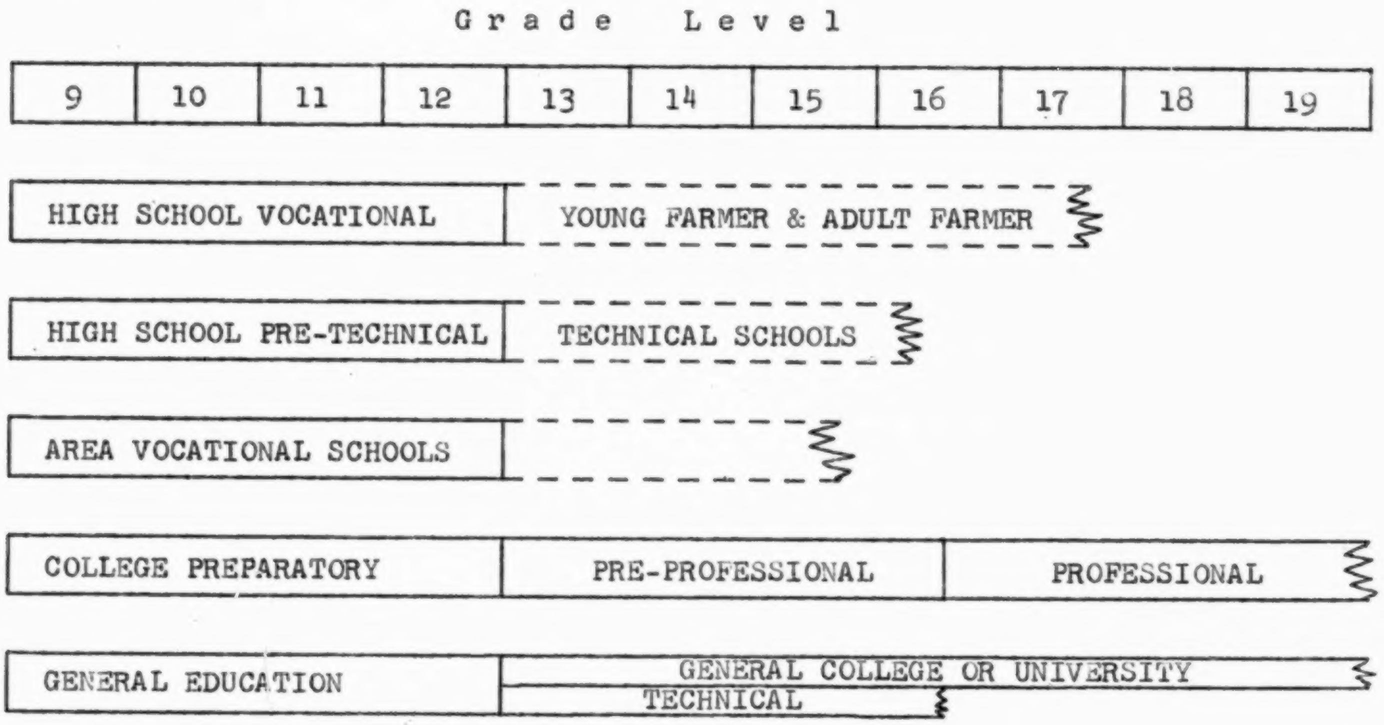
> An agricultural technician is a worker located between the skilled worker and the professional in the job classification structure, in his work performance, and in his educational attainment. He possesses the skill and ability, working independently or with minimal supervision from a professional, to analyze and interpret information, diagnose problems, make decisions, and make practical applications of theoretical knowledge in performing specific tasks in a specialized field in the production, processing, distribution, or marketing of goods and services in agriculture. He must exercise cognitive skills primarily but also must be able to supervise and perform manipulative skills.

The following diagrams and guides are presented to further define the technician, his training, and qualifications.

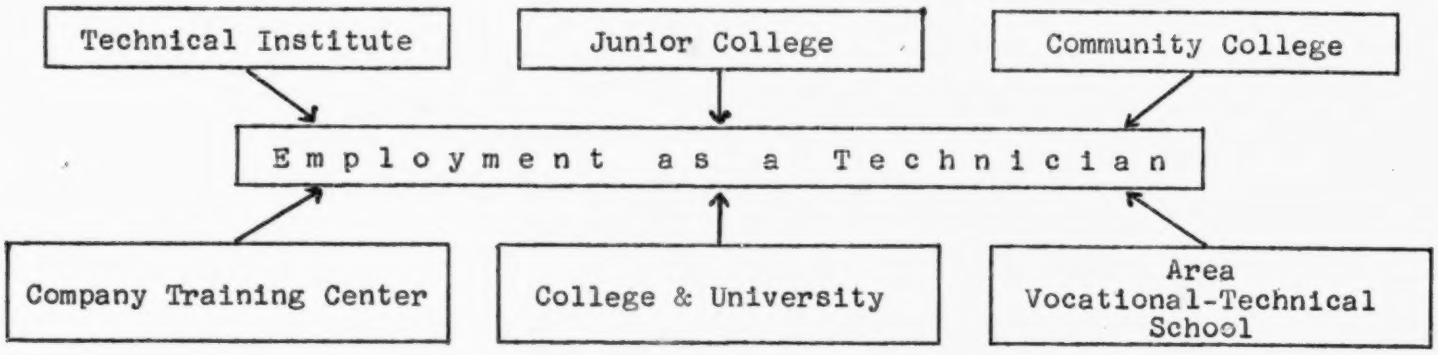
1. THE POSITION OF A TECHNICIAN ON THE LEVEL-OF-OCCUPATIONAL-PREPARATION CONTINUUM


Unskilled
Semi-skilled
Skilled
Technical
Professional & Scientific
LEVEL-OF-OCCUPATIONAL-PREPARATION CONTINUUM

2. PATTERNS OF EDUCATION


Grade Level
9
10
11
12
13
14
15
16
17
18
19
HIGH SCHOOL VOCATIONAL
YOUNG FARMER & ADULT FARMER
HIGH SCHOOL PRE-TECHNICAL
TECHNICAL SCHOOLS
AREA VOCATIONAL SCHOOLS
COLLEGE PREPARATORY
PRE-PROFESSIONAL
PROFESSIONAL
GENERAL EDUCATION
GENERAL COLLEGE OR UNIVERSITY
TECHNICAL

3. INSTITUTIONS ENGAGED IN TECHNICAL EDUCATION IN AGRICULTURE

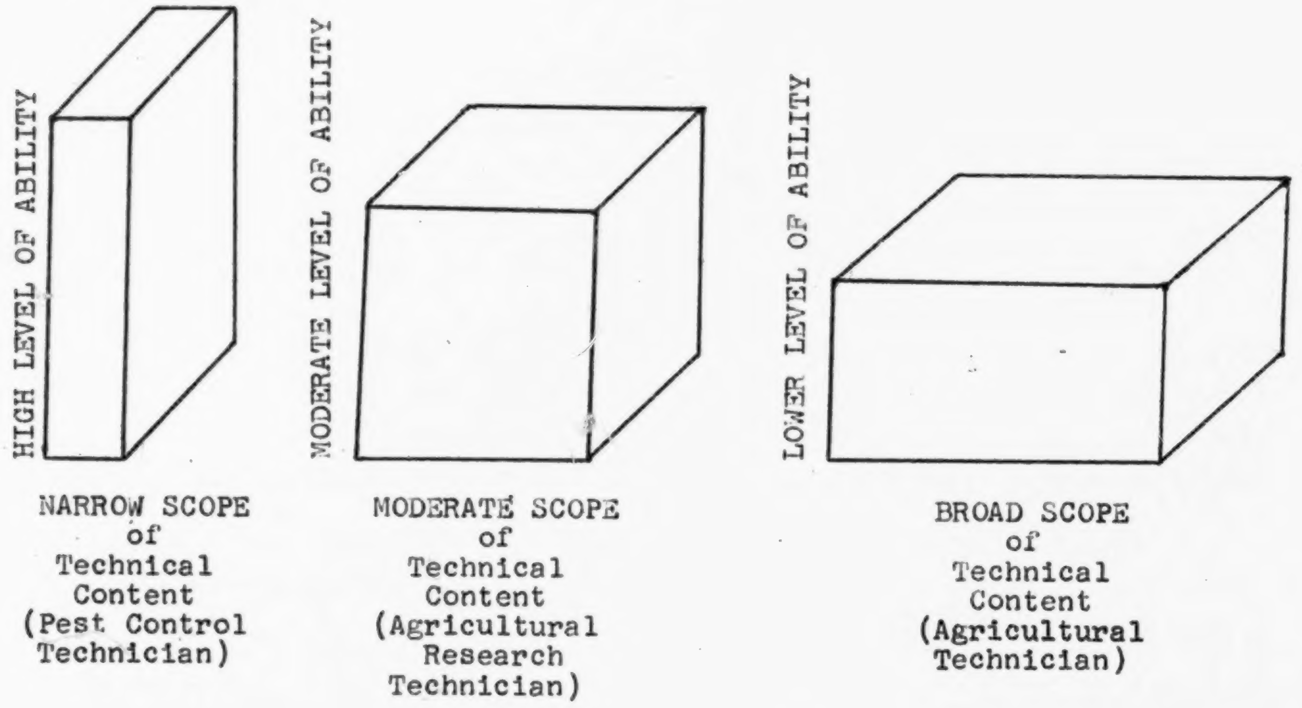

Technical Institute
Junior College
Community College
Employment as a Technician
Company Training Center
College & University
Area Vocational-Technical School

4. EXAMPLES OF JOB TITLES OF AGRICULTURAL TECHNICIANS

Quality Control Technician
Pest Control Technician
Agricultural Research Technician
Soil Conservation Technician
Agricultural Engineering Technician
Forestry Technician
Agricultural Biological Technician
Turf Grass Technician
Landscaping Technician

Laboratory Technician
Plant Quarantine Inspector
Shop Foreman
Field Service Manager
Animal Science Technician
Standardization Inspector
Fieldman
Products Technician
Farm Management Technician

5. TYPES OF TECHNICAL OCCUPATIONS AND PREPARATION


HIGH LEVEL OF ABILITY
MODERATE LEVEL OF ABILITY
LOWER LEVEL OF ABILITY
NARROW SCOPE of Technical Content (Pest Control Technician)
MODERATE SCOPE of Technical Content (Agricultural Research Technician)
BROAD SCOPE of Technical Content (Agricultural Technician)

6. GUIDE FOR PERSONNEL CLASSIFICATION ACCORDING TO LEVEL-OF-OCCUPATIONAL PREPARATION

Professional Level

That preparation and/or experience for occupations requiring a high degree of mental activity. This generally requires an academic background of several years of formal education in organized courses concerned with theoretical and practical aspects of complex fields of human endeavor, culminating in a baccalaureate or higher degree. A license, registration, or certification is normally needed. Examples include agricultural engineers, soil chemists, plant pathologists, and medical doctors.

Technical Level

That preparation and/or experience for occupations requiring both cognitive (know why) and manipulative (know how) abilities, theoretical and practical understandings, and a high level of job competence; preparation normally acquired in specialized post-high school training programs; generally considered as semi-professional preparation to prepare persons to bridge the gap between skilled workers and professional personnel. Examples include surveyor aids, draftsmen, engineering technicians, and sales technicians.

Skilled Level

That preparation and/or experience for occupations requiring crafts and manual skills, a comprehensive knowledge of work processes, and a high degree of manual dexterity learned to a great extent through work experience and apprenticeship periods. Examples include mechanics, machinists, spray painters, and welders.

Semi-skilled Level

That preparation and/or experience for occupations requiring the exercise of manipulative ability of a fairly high order, but limited to a fairly well defined work routine; typically an operative type activity with the major work reliance upon vigilance and alertness, in situations in which lapses in performances would cause extensive damage to product or equipment. Examples include operators of field crops cultivators, orchard sprayers, harvesting equipment, and pruners.

Unskilled Level

No formal training or experience required. Work performed is predominantly manual, requiring performance of simple duties that may be learned within a short period of time and which require the exercise of little or no independent judgment. Examples include fruit and vegetable pickers, truck loaders, parts washers, and farm hands.

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Mr. Drake
Mr. Whitney
Mr. Sutliff
Mr. Brinkman

Mr. R. C. S. Sutliff, Chief, Bureau of Agricultural Education, New York, moderated a panel discussion on "Problems Associated with Establishing an Agricultural Business Technology Program." Other panelists shown here are (left to right): Warren G. Weiler, State Supervisor of Agricultural Education, Ohio; H. B. Drake, Coordinator of Agri-Business Technology, Springfield and Clark County Technical Education Program, Springfield, Ohio; Charles W. Whitney, Executive Director, Farm and Power Equipment Retailers of Ohio; and R. O. Brinkman, Director of Technical Education, Springfield and Clark County Technical Education Program, Springfield, Ohio.

JOLIET JUNIOR COLLEGE
OFFERS
"Agricultural Supply Curriculum"
TWO YEAR PROGRAM
The First in Illinois.....
JOBS AVAILABLE

Mr. Max H. Kuster, Head, Agriculture Department, is pointing out some of the features of the new Agricultural Supply Curriculum at Joliet Junior College. On-lookers include (left to right): A. W. Tenney, Director, Agricultural Education Branch, U. S. Office of Education; Lloyd J. Phipps, Chairman, Department of Agricultural Education, University of Illinois; and Robert E. Taylor, Director, National Center for Advanced Study and Research in Agricultural Education.

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PART II

PRESENTATIONS
BY THE
CONSULTANT STAFF AND PANEL GROUPS

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WHAT IS A TECHNICIAN?

by

Byrl R. Shoemaker
State Director of Vocational Education
Ohio

This is a general overview of what you are going to cover this week. From here on you will begin to talk about details. Mr. Mount mentioned to you that agriculture is changing. Most of us in the field of administration say it has to change. I would be willing to agree (and not coming directly from the field of agriculture, I think I can say this) that the agriculture program at the high school level, combined with a sound FFA program, is probably the finest general education program that I know. I would say, and say honestly, that we have proved through a study for Dr. Bender that graduates of the agriculture program who go on to college do as well as their counterparts with equal ability. About ten to twelve percent of our students from the agriculture program at the high school level go on to college in Ohio. I would say, "This is fine and we can approve of this."

But I will say just as honestly that neither one of these factors will keep vocational agriculture in business. Neither one will keep vocational agriculture in the curriculum because they are not unique to vocational agriculture. You may be doing them better than any other program in the school but they are not unique because each program in the school has a responsibility to contribute to the general education of youth, and they have a college preparatory curriculum which is entirely acceptable to the universities. I am not downgrading those factors of your program, but I am merely saying if they are not unique to your program they're not going to keep you in business, so change is important in agriculture as the work force of our nation changes.

You're under fire--have been. Many of us have talked and explained the need for continued vocational agriculture because of the fine job you're doing. Too many people want to do away with it.

Many of our fine people in agriculture did not become concerned about the growth of area vocational centers because they felt that one- and two-man agriculture departments in small schools could satisfy the needs in agriculture. Again, I say, "It ain't so." You now have the same problem in agriculture that all of the other phases of vocational education have in terms of not one program but a number of different programs; and if you aren't concerned now, you had better become so. You no longer have one general program that can solve all the problems and serve all the needs of agriculture. You know now the need for separate programs, separate emphasis, specialization, if you want to call it this, in terms of your area of agriculture. Yes, you're going to have production agriculture in terms that you have known it, but you're also going to have horticulture, floriculture, landscaping and nursery work, and off-the-farm agricultural occupations in many areas that I am not here to talk about today.

One of the areas of need is technical education. The people providing funds for you are not going to accept and listen to the figures from the Department of Agriculture about how many people are working in agriculture. They may be right and they may be wrong. Right or wrong, what I'm saying is that they're not going to listen to facts that fifty percent of the people are in the field of agriculture. Our federal government, our state, our legislative committees that I have met with (and I am only talking to you from my standpoint and as I have met with congressional committees) are talking census figures and Department of Labor projections. Now you may not like this, but this is the basis on which they are working. These are some of the real problems you face as you move ahead with technical education and other phases of agricultural education.

Let's look quickly, then, at something we have done in terms of trying to identify the levels of people and numbers of people in agricultural education. We had a chart (Figure 1) which we have been using for years in which we pointed up some of these occupational levels and needs in Ohio from the census figures of 1960. We found, for instance, that 42.2 percent of our people, according to our census, are employed as craftsmen, technicians, operatives, or semi-skilled workers in industry. We found that 7.6 percent of our people were in occupations requiring a baccalaureate degree. We have some other people with baccalaureate degrees in these other areas.

Now our first chart on employment showed that 3.7 percent of our people were employed in farm production agriculture occupations, and according to our census, that's all they show. Now you can quarrel with that and argue with it, but the point is, this is the figure used by our people in government.

Herb Brum conducted a very sophisticated study. I don't know whether it's going to be reported at this conference or not. But his study is supported by all the help The Ohio State University could give it and we appreciated that. Out of this came information that in Ohio there were 5.3 percent of the state's labor force in the non-farm occupations which required skills in agriculture--required them. This study will stand up under heat and examination. We found that 5.3 percent are in non-farm occupations requiring agricultural skills in addition to the 3.7 that were in production agriculture. Clerical office practice, 14.4 percent; distribution, 14.7 percent; other, 12.1 percent.

But that looks like a small figure until you begin to project it and compare it with the number enrolled. Too many people think we have too many people enrolled in agriculture. Taking those figures which we can sell to anyone on the basis of their source, let's look at how our students are enrolled (Figure 2.) We find that 3.1 percent of our students are enrolled in trades and industrial education; 2.1 percent of our students are enrolled in vocational agriculture; and 11.8 percent are enrolled in office practice programs; with 0.7 percent in cooperative office practice programs; 1.3 percent in vocational distributive education; and 81 percent in college preparatory or general. And we can't tell you how many are enrolled in a sound college preparatory course, and how many are enrolled in a program just to get the necessary 16 3/4 credits to graduate.

So this is a comparison figure in relationship between on-going programs and training needs. They still show the need for our present agricultural education program and a growth of programs to prepare people for specialized farm and off-farm occupations.

Now we took the Department of Labor figures on employment projections and added one more to them (Figure 3). If you'll come down from the top, you will see that the term "technical" was left off and should be added to the word "professional". Professional and technical are going to increase about 50 to 55 percent; management occupations, about 23 percent; clerical, about 31 percent; sales work, about 28 percent; craftsmen, about 18 to 23 percent; operatives or semi-skilled workers, 18 percent; service workers, about 25 percent; and laborers, no change. This is what Mr. Mount referred to: The laboring group who earn their living with their backs are going out of business. The farmer and farm worker--the projection is that there will be 18 per cent less production people on the farm in agriculture.

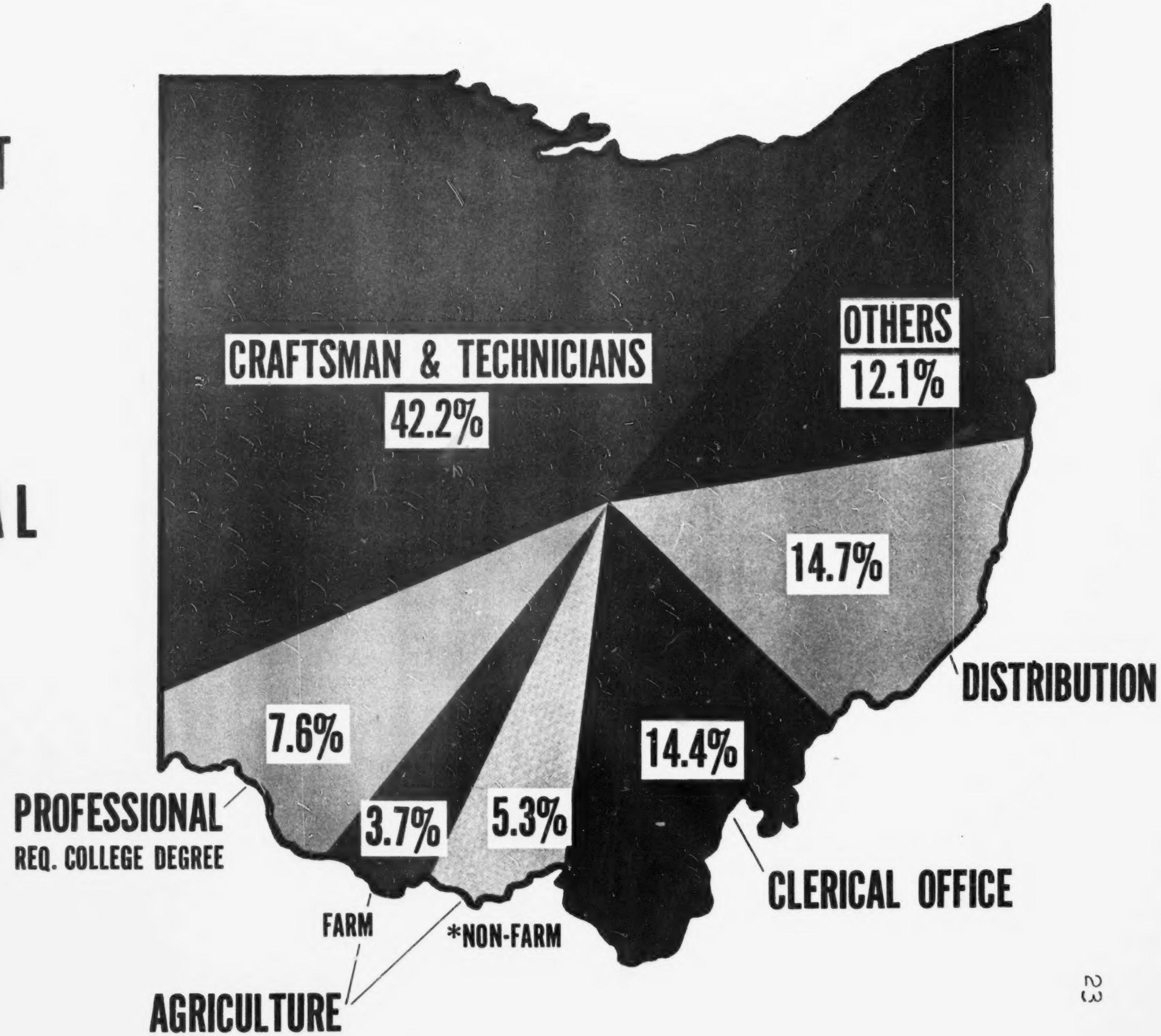
We took the study that was made by Herb Brum and others and projected it on the basis of all of these other figures and identified a twenty-eight percent increase in non-production agriculture occupations. We are going to need about a twenty-eight percent increase in terms of people employed in the broad framework of agriculture, people with essential skills and knowledge in the area of agriculture.

One of the new areas for expansion in all vocational fields, whether it's agriculture, business, or whatever, is in the area of post-high school education at both the skilled and the technical levels. Now I am going to use the term "skill" when I speak of what you normally class as your agriculture programs--as a skill level of program as contrasted with technical education.

Mr. Mount identified it so clearly when he said they have people of all ranges in this technical area. Everybody can be called a technician. The person that comes into your home and changes one TV tube after another until he finally hits the right tube is called a technician. The brake specialist who does nothing but work on your brakes calls himself a technician. Everyone calls himself a technician today. It's a popular term.

Some of the vocational programs at the high school level are called technical because the idea of technical is popular. People want to call everything technical and you can become quite confused. It took me two or three years, several years back, to try to figure this thing out before we finally identified our purposes and just what should be called technical. As we began to talk about technical education to the people in agriculture they said, "Wonderful!" In the post-high school program

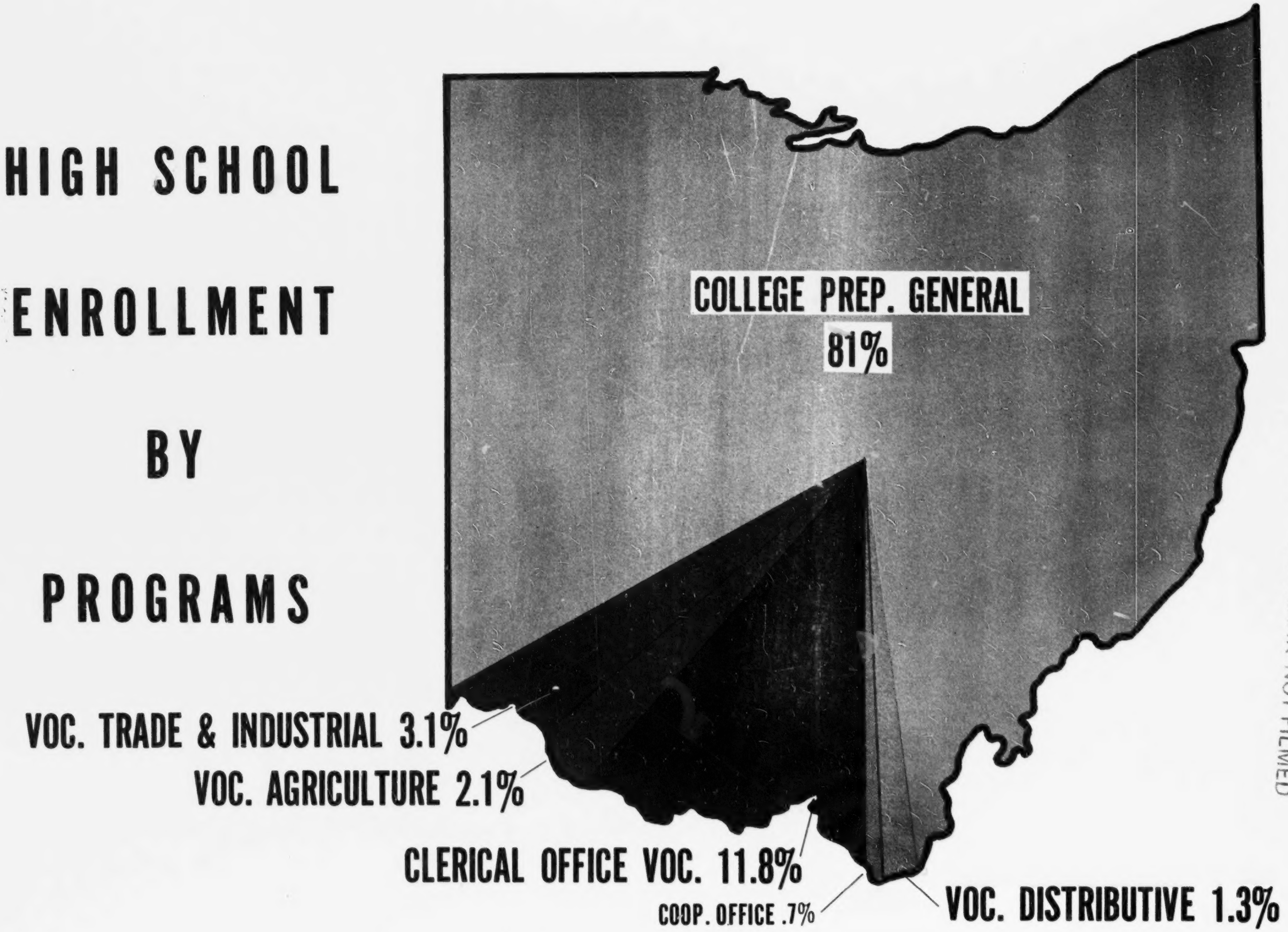
EMPLOYMENT BY OCCUPATIONAL AREAS



Source: U.S. Census - 1960
*STATE DEPT. ED. STUDY

Figure 1

HIGH SCHOOL ENROLLMENT BY PROGRAMS



Source: State Dept. of Educ.

Figure 2

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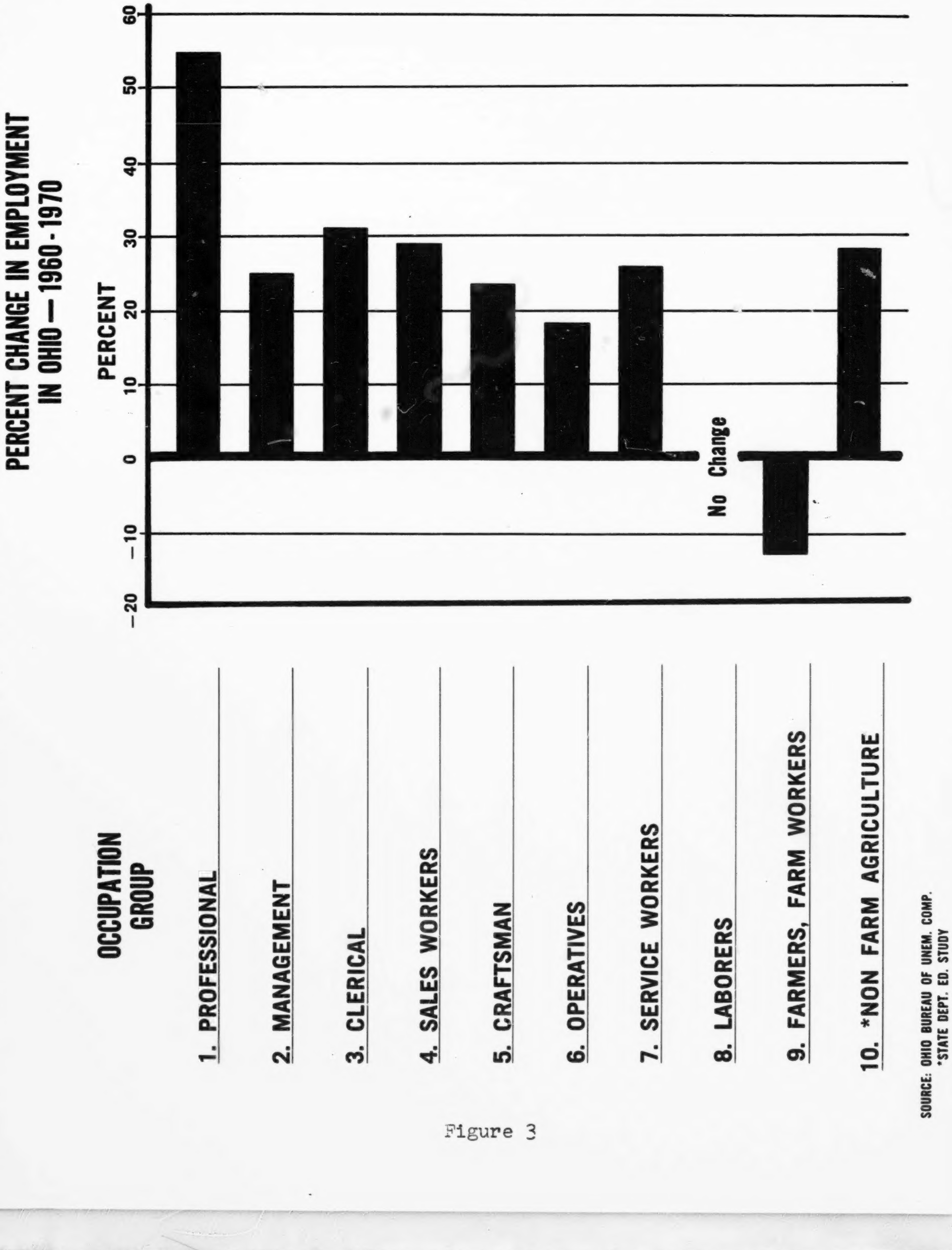

SOURCE: OHIO BUREAU OF UNEM. COMP.
*STATE DEPT. ED. STUDY

Figure 3

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we'll train some fine mechanics. The thought was expressed, "I do need a helper on the farm and if you'll train a person two years beyond high school, I know he will make me a better helper on the farm." Well, gentlemen, this is fine, but it's not technical education. It is important to do, and when I speak today about technical education I'm not downgrading in any way the need for continuing the other areas of horticulture and agricultural training. Too often, as we begin to talk about technical education, we think we have to step on everything else that's been done before in order to build technical education. This is not true. We are talking about another area--a new possibility in the area of education.

Technical education in agriculture is new. It's so new that educators are going to lead the industry. Industry isn't hollering for technicians in agriculture right now for the very simple reason that they don't know what a technician is. They don't know what they can do.

I was in Indiana where they had some exhibitors. I was talking to a man who was handling chemicals for agriculture and as we talked we began to find out that that area of work needs some technicians. They've been using engineers for a certain spot. He said, "We don't need engineers, but we don't have anything else to put in that occupation."

So a point here is that you're going to lead, not follow, the industry in terms of technical education; but in leading you must have the full support of the potential employers. One, you've got to have the support of the employers to the point that they will employ the people that you're going to train. Secondly and just as important, you've got to have the support of the professions that these technicians are being prepared to support. An example: We're not ready in Ohio to have technicians in veterinary medicine because the profession is not ready to support it. My point is very simple: Until the profession is ready and willing to support that area, you'd better work on something else because that is a group that you're oriented to in a technical area. You must have the support of the profession.

It's pretty important to understand the level and place of technical education, so I want you to use a chart clear out of your field in a segment of employment in which the technician has been developed rather highly--in the industrial field related to engineering. Here, we're going clear out of your field. I'm going to move to the area of industry and talk about the levels that we look at, the spectrum of employment in industry.

At one level to the right on Figure 4 you have a small group of people, even smaller than shown here--a group of people called "scientists". These are trained in your graduate programs in the universities. You very seldom, if ever, find a scientist that came up the hard route. It's hard enough going the way he has to go through the university level. But this is a small group of people.

Engineers support the scientists. These are the people who take the ideas, the raw ideas, from the scientists and develop them into something that you and I can use. You've known about engineers for years--mechanical, civil, electrical, aeronautical, chemical--all the engineering fields, and in your own area, your agricultural engineers. This is a professional level. Whatever your professional levels are, they would fit in here, trained at the baccalaureate level in the university. They have been pushing the engineer more and more into the theoretical level. They've required more knowledge in the engineering levels. It used to be that when I graduated from college, to become an engineer a person had to spend five years "on the board" as they called it--five years drafting in order to become an engineer. Today, the engineering school doesn't even have time to give them the skills of drafting. In civil engineering, they had to drop surveying because they don't have time, with all the other things they teach, to put this in engineering.

So a new place has been developed in the field, not substituting for the professional, not substituting for the skilled, but a whole new area of education related to engineering, a group of people which we are calling technicians. This is the group of people of whom we are speaking as we use the term "technician" in Ohio.

Supporting this group of people are the skilled craftsmen, machinists, tool and die makers, welders, sheet metal workers, cosmetologists--what we class as the skill-crafts level in the industrial area. A supporting group for them are the semi-skilled workers, the individual machine operator whom we class as semi-skilled. Then the fading group at the other end are the unskilled.

The only reason for identifying these people separately is that you organize an educational program differently to serve each group of people and that's the only reason--not for status purposes, but because you're going to organize their educational program differently.

If we look at the area on the chart below the broken like as being the amount of technical knowledge required by these different occupational groups and the area above as the amount of manipulative effort and skill required, we'll get some concept as to why the programs are different for these groups.

As we delve into the craftsman level here, there are even different levels of technical knowledge needed. At one end might be the bricklayer who has great need for mechanical skills but less need for technical knowledge. At this end of the occupational area there might be an electrician, most of whose work is in what he knows. This group of skilled people are concerned with construction, maintenance, repair, and servicing.

As we move to the technical group, we are talking about design, development, testing, and management. This is the easiest way I know to explain it to a group of industrialists. For this group, then, their stock in trade becomes their technical knowledge. They don't need to be able "to do" as much as they need to be able "to know" about doing and be skilled in the work related to the professional area. You draw the correct curriculum content and organization of the program from the professional field, providing sufficient skills for this field to enable them to understand about the area. Science and engineering, of course, move on higher and higher in the realm of the theoretical and the technical ladder.

Let me give you a team relationship. Here might be a mechanical engineer, a tool and die designer, and a tool and die maker. All three are part of a team relationship--no one serving the job of the other one or taking over the job of the other person.

You will have others speaking before you about other points of view and, as was pointed up, no one is here to sell you a package that you'll buy. You have to apply this, what you hear, the ideas that you hear, to your own situation, in your state, and in your local area.

In Ohio, we set up these standards as we began to develop post-high school technical education, and, incidentally, we believe that technical education is post-high school education. We believe that vocational or skilled level education can be done at the high school level but we believe true technical education is post-high school education. We have set these standards for ourselves in Ohio. They may or may not be acceptable to your group and some others may have some better ones as they talk with you this week. We require technical education to be a two-year, post-high school program and we're looking at technician training as a level of education, the same as we looked at professional training.

Professional training cuts across all these fields, as Mr. Mount mentioned. We believe that technical education will be a level of education which cuts across all of these fields, the same as a professional area and professional level does at that top level. We don't believe that any field of work is going to be left out if it is alive and awake as far as technical education is concerned.

The two-year, post-high school program is in session thirty-six weeks per year. We have a minimum attendance in class and lab of twenty-five hours per week. Now this is heavy. We've started on this basis. In addition to this is all the home study.

In terms of curriculum, we have set standards on a rather broad basis. We say that 15 percent of the time over a two-year period must be spent on basic skills. In agriculture this would be learning about actual agricultural practices, and in tool and die designing it would be learning how machine tools work.

Twenty percent of the time is spent on communications, including report writing and industrial economics. Twenty percent is on communications because the ability to communicate is important to a technician as he relates both to the engineer and to the skilled worker. Fifty percent of their time is on math, science, technical information, and laboratories related to that field of work. You see,

RELATIONSHIP OF KNOWLEDGE AND SKILL IN INDUSTRIAL OCCUPATIONS

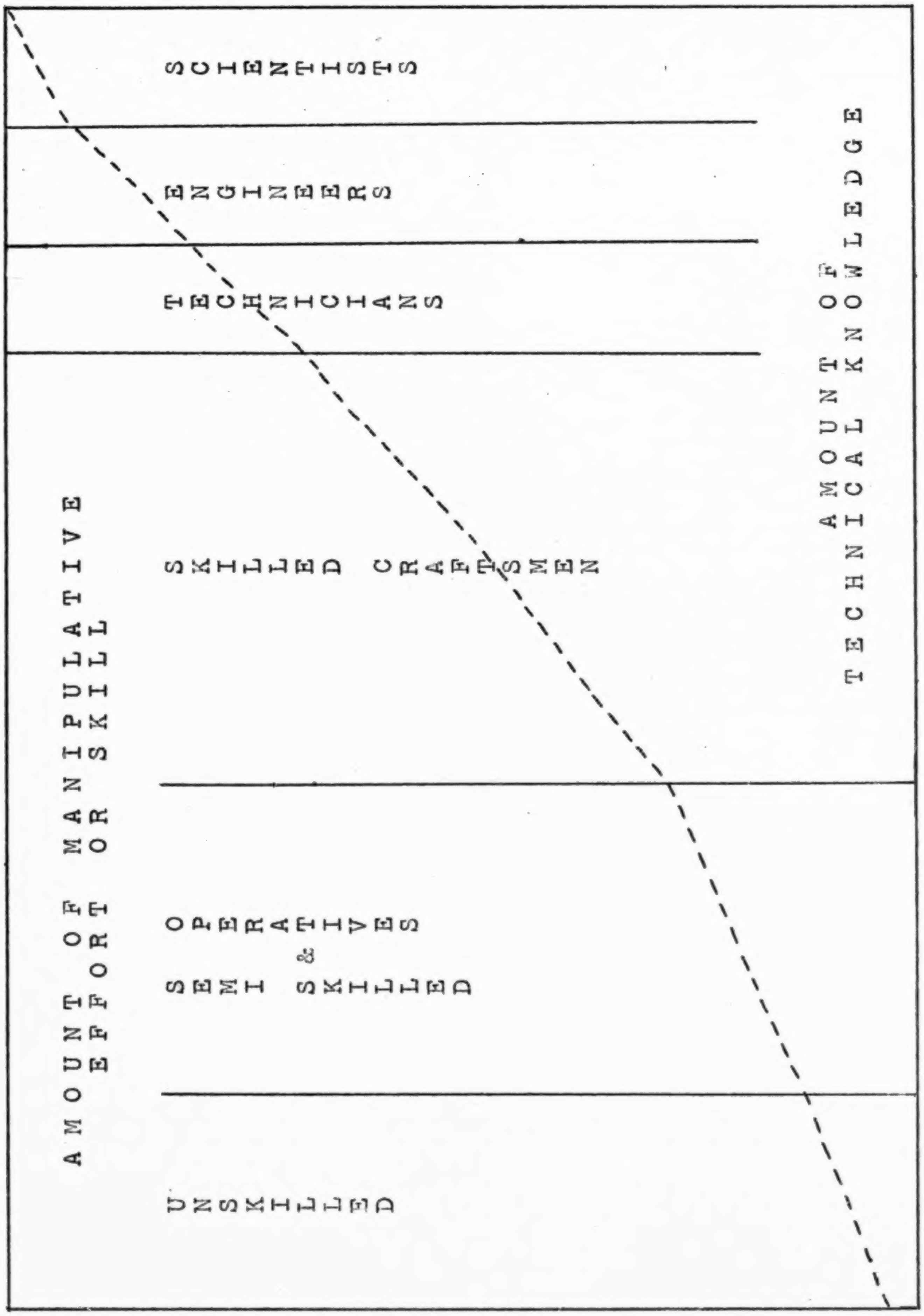
SCIENTISTS
ENGINEERS
TECHNICIANS
SKILLED CRAFTSMEN
OPERATIVES & SEMI SKILLED
UNSKILLED
AMOUNT OF MANIPULATIVE EFFORT OR SKILL
AMOUNT OF TECHNICAL KNOWLEDGE

Figure 4

this applies to any technical field, whether it is engineering technology or agricultural or business or whatever area it may fit.

Fifteen percent of the time can be spent on anything--ancient Greek, cultural subjects, or whatever you would wish to use. There is one interesting thing--in all the curriculums that have been submitted to us so far, this fifteen percent of the time has been put back on the technical area.

All of these curriculums that have come to us have been reviewed, not only by our educators but by the people to be served. No technical curriculum should ever be established without involving the employers who are going to employ and the professions to which the technicians are going to be related. These two groups must be involved in the establishment of any curriculum. No matter how good you may think you are in curriculum development, the efforts cannot leave these people out and have the person accepted and prepared to do the job for which he is being educated.

This has become our standard in Ohio for a curriculum as it comes in and these are the only bases. We use these broad bases which leave plenty of leeway for the adaptation of the curriculum to the needs of the group to be served.

In terms of staff, right now (and these standards can be changed as we get more experience in this area) we see a combination of five years of training and experience. If they are going to teach technical courses, they have to have at least two years of collegiate level training. If they are going to teach a skills area, they have to have at least two years of experience. You say, "Those standards are pretty low." Yes. But nothing prevents you from going as far above the standards as you want. We have found in staffing our technical education areas that we have had to have a very flexible standard for the staff personnel that we use.

Most of the people, I would say, come from the professions. Most of the instructional staff come from the profession to which the technical area is related. In the majority of our engineering technologies the majority of the staff personnel come from the engineering field. So we encourage the people to look toward the professions for their staff personnel, along with specialists in areas that they may have need of in terms of their curriculum area.

In terms of students, again, this is not a course for drop-outs. We say in Ohio that the person must have graduated from high school or have passed the equivalent examination. We put the equivalency factor in our standards to allow for that boy who is a late bloomer and suddenly decides that he needs something and wants to do something. We wouldn't rule him out. For all practical purposes, our technical areas require high school graduates. We have encouraged the technical centers to test the student in terms of his potential, his abilities, and his achievement levels, and enroll him on that basis rather than require a certain set of subject areas. In some cases a boy would have to take time for some brush-up courses, as he would in going to a university take some additional areas of study before he could enter.

We have to add about twenty to thirty thousand dollars of equipment in the engineering areas in order to equip the laboratories and special labs for a technical area, in addition to all of the equipment existing in a public school vocational center. I believe that in the one agriculture program about $10,000 was added. This will be explained to you a little more in detail later in the week.

But technical education is not cheap education. It is expensive education just as college education is expensive education. Therefore, it has to be organized to do a job. Enroll the students that can achieve, in order to be acceptable on an economical basis.

It has been mentioned that technical education could be provided in many ways, and so at this conference you are probably going to hear about these many ways. A part of how you do it in your state is going to depend on the political organization of your state. At the present time in Ohio, we are functioning with eleven technical centers with anyplace from three to five technical areas of the type that I have described operating in these centers. But we are doing it a little bit "under the counter" on the basis of existing vocational laws rather than any pattern or laws in Ohio dealing directly with technical education. It is being done in some states under a university. I think in Indiana they have had some technical education at Purdue for years. In some places it is being done in the university branches, throughout the state. It is being operated through the community colleges. I notice our good friend, Wes Smith, from California, is here and undoubtedly will review these with you. It is being done through technical institutes. New York State has a technical institute approach. Some of these are under public education control; some of these areas are under county and state control. So you can find anything you want because we have such a heterogeneous operation throughout the nation.

Conant made his study of community colleges in California, but he made the statement that community colleges might not fit in Ohio because of the pattern of organization of education that has grown up within that state.

The issue is: Wherever you put it, will it become primary education or will it become secondary education? By this I mean, will it become a primary function and concern of that institution in which the student is enrolled, in which he feels a status in being enrolled, or will he feel himself a secondary citizen "not able to make the first team so I'm on the second team"? This is an issue that those of us in vocational education know from way back. We have had to live with this problem of trying to become primary education.

We say that the curriculum should be such that it is not controlled by a desire of those who are going on to a four-year college program. My feeling (I'm expressing opinion here now, not fact) is that if you organize your curriculum so as to provide college level credit, you will not end up with a technical program at the level which will best serve the person and industry and the business. It must have a level of its own; it must have a curriculum of its own; it must have a status or position of its own, if it is going to grow and serve rather than gradually evolve into the first two years of a college engineering program. You don't need technical education for that. The colleges have very fine first two-year programs leading into engineering fields. Such a procedure would provide a "me, too" operation. You will find in some places that the two-year institutions, some very fine institutions, apparently have become simply ashamed of what they were doing and are trying to grow into four-year educational engineering institutions.

Let me show you a couple of curriculums that have been developed here in Ohio, and we have some copies of these which will be passed around to you. This is the one that will start this fall and this curriculum is still tentative. This is the curriculum the students will follow in terms of a two-year, post-high school agricultural equipment technology program. The people from the field, the leaders from the field of agriculture, sat with our staff and determined that one of the areas that was needed was an agricultural equipment technician, not a repairman. This man will not repair equipment. Repairing equipment is good and needed but it is not a technician level program. This will be a type of curriculum that will be used, as we see it now, for the students entering a two-year, post-high school program in agricultural equipment technology.

One other one here, but which has already been in operation one year, is the one in agricultural business technology. Identified here are some of the types of occupations in which these people will go--feed and farm supplies; sales and purchases; marketing farm produce; production, use, and application of farm chemicals; seed selection and uses. These are the types of occupations for which these people are being prepared and there is the curriculum which is planned. These students have completed one year.

We're a little slow, maybe, in getting started in agricultural technician training. This is our first; it was started last year. The agricultural equipment technology will start this next fall. We know that a conservation technician program is needed in Ohio to train people to work with agronomists. We know about other areas, but we just have not been able to move fast enough. The present programs are experimental. Once we have determined that they are functioning well, we will move them to other technical centers in Ohio.

So, in summary, I would say this: Wherever the profession will accept a paraprofessional (and I have begun to use this word simply because I don't like the word "semi" under which we seem to be putting a status situation in terms of the individual), a person who works alongside a professional--wherever there are enough jobs to warrant the training, you can establish a technical program to prepare paraprofessionals for them. I believe sincerely that technical education in agriculture, in business, in all areas in our state, is going to be one of the fastest growing educational areas. I also say just as sincerely that it is not going to serve the greatest number of people in vocational education. It's important; it's a new area; it's something that everybody is interested in and wants to establish. We must do it, but as we do it, let's not forget to maintain sound programs, broad programs, developing programs in our total field of vocational education, which, to me, includes technical education.

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AGRICULTURAL TECHNICIAN TRAINING POSSIBILITIES AND RESPONSIBILITIES

by
A. W. Tenney
Director, Agricultural Education Branch
U. S. Office of Education

I am highly pleased that you have given me an opportunity to participate in a National Seminar on Agricultural Education on the Preparation of Agricultural Technicians. I am delighted to see such a large representation of State supervisors and teacher educators in agricultural education and representatives from agricultural colleges, junior colleges, and technical institutes. I note that more than forty States are represented at this seminar.

Dr. Taylor and others associated with the National Center are to be commended for the excellent plans that have been made and for the strong leadership that is being provided in agricultural education.

As we start the seminar let us recognize that we are discussing the preparation of technicians for our largest and most basic industry. Sometimes people forget the place of agriculture in our lives today. It is helpful for us to review the facts concerning farming and agriculture. According to the latest information available from the U. S. Department of Agriculture, we have some 3.7 million farms. These farms have total assets in excess of 217 billion dollars. These assets are more than two-thirds of the market value of all corporation stocks listed on the New York Stock Exchange. In 1963 more than 36 billion dollars worth of products were marketed by our farmers. Industries allied with agriculture employ 40 per cent of the working population. A total of 58 per cent of the United States' land is in farms.

It is recognized that for many years, due to the efficiency of production on the farm, it has become possible for a smaller number of farmers to product an abundance of food and fiber for our nation. We must recognize, however, that agriculture is more than farming. According to Dr. Robert S. McGlothlin, Industrial Economist, Stanford Research Institute:

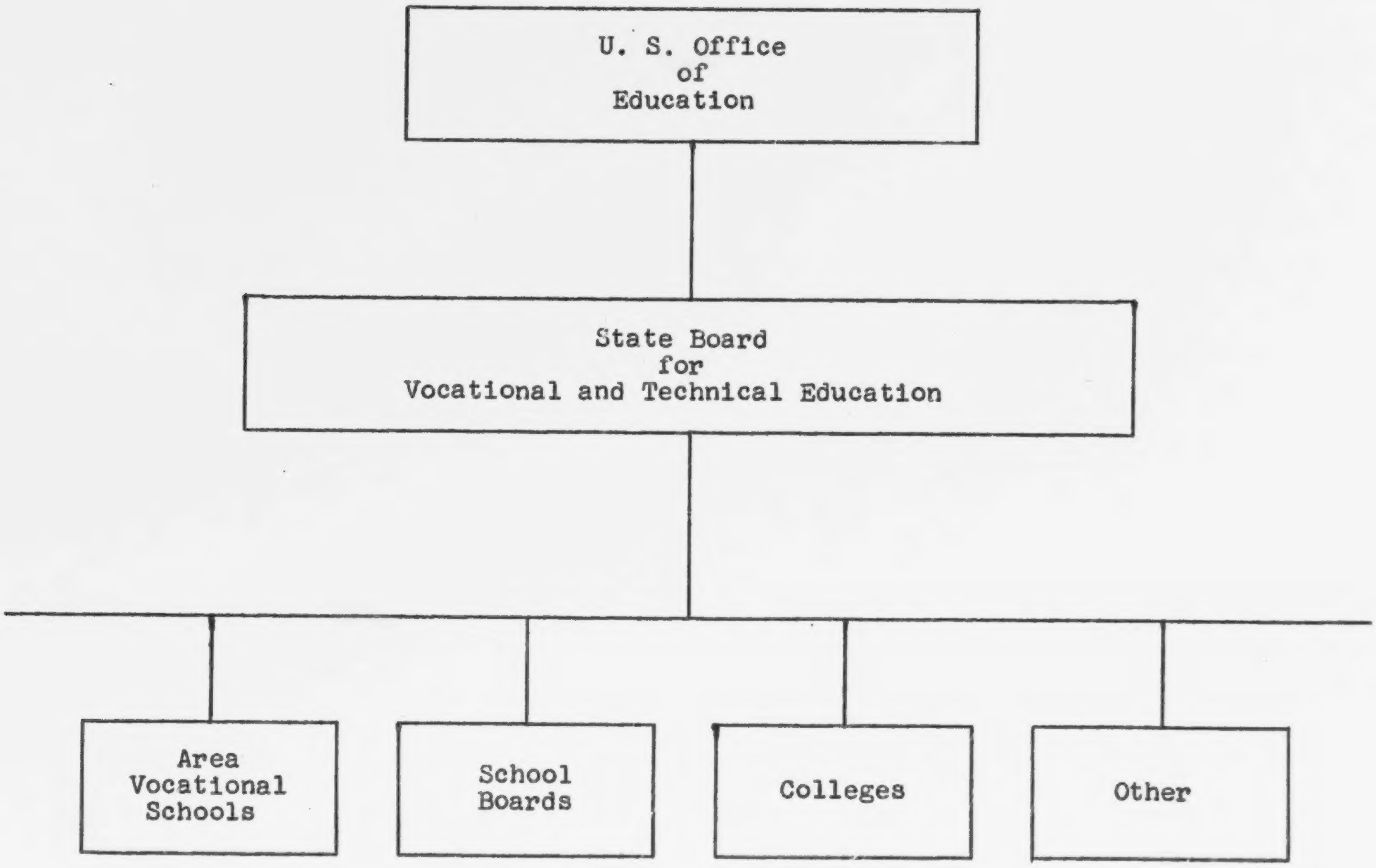
> That the traditional concept of agriculture as farming and ranching is invalid is further emphasized by the number of people engaged in agriculture. Between 1947 and 1954, the workers in agriculture remained essentially constant, at 24 million. However, the decline in the farming segment has been almost exactly balanced by a rise in non-farm agricultural employment. For every person leaving farming and ranching, one is added in non-farming components of the industry.

So, today as we launch our "Seminar on the Preparation of Agricultural Technicians," we have a challenging task to meet the broad need for preparing technicians for farming as well as for related fields which demand technicians with an agricultural background.

We are delighted to have many associates with us today who may not be completely familiar with our administrative structure in vocational education. For this reason I should like to call your attention to the chart on the following page which illustrates the Federal, State, and local relationships that exist. The U. S. Office of Education has been authorized by the Congress to administer the funds appropriated for education.

Since 1917 this administrative structure has worked most effectively. Each State has a State Board for Vocational and Technical Education. This State Board has prepared a plan for the operation of vocational education in the State. This plan is submitted to the U. S. Commissioner of Education for approval. After the plan is approved, the State is required to operate the program under the provisions of the State plan. The State Board in turn contracts with local school boards, area schools, colleges and other institutions as necessary to provide the vocational training needed.

The Federal-State administrative structure has proved invaluable for administering war training programs and for launching new and enlarged programs of vocational education.


U. S. Office of Education
State Board for Vocational and Technical Education
Area Vocational Schools
School Boards
Colleges
Other

Since 1917 many reviews have been made of vocational education. The late President Kennedy recognized that many needs for occupational training were not being met. As a result, he requested the Secretary of the Department of Health, Education, and Welfare to appoint a Panel of Consultants to make a careful review of vocational education and of the needs for the continuation and expansion of such programs. This distinguished Panel included in its review the need for technician training. The following recommendations made by the Panel are related to technician training and to vocational agriculture training programs:

> Our advancing technology demands more skilled craftsmen and highly skilled technicians in occupations requiring scientific knowledge. Vocational and technical education must prepare many more technicians and skilled craftsmen for employment in industry, business and agriculture and the health fields.
>
> The area vocational school and the specialized vocational school in large urban centers both provide a diversity of occupational training programs to large numbers without the usual restrictive residence requirement. Many more of these schools are needed, especially for training highly skilled craftsmen and technicians.
>
> Technician training is also available in community or junior colleges, agricultural and technical institutes, and vocational-technical schools. To expand their output--a national need of urgent importance--the Federal Government must increase its support of full-time, post-high school vocational and technical training.
>
> The vocational agriculture program under Federal reimbursement, should be broadened to include instruction and increased emphasis on management, finance, farm mechanization, conservation, forestry, transportation, processing, marketing the products of the farm and other similar topics.

In its "Agenda for Action," the Panel recognized that there is a need to meet the critical need for highly skilled craftsmen and technicians through education and training beyond high school. The report of the Panel of Consultants was made available to the Congress. After detailed hearings and careful study, Congress passed the Vocational Education Act of 1963. This Act was enacted:

1. To maintain, extend, and improve existing programs of vocational education;
2. To develop new programs of vocational education;
3. To provide part-time employment for youths who need the earnings from such employment to continue their vocational training;
4. To develop programs for persons with special educational handicaps;
5. To provide programs for employed persons to upgrade their skills or to learn new ones.

The Congress has not yet appropriated funds to implement this Act. It authorized appropriations as follows:

1964 -- $ 60,000,000

1965 -- $118,500,000

1966 -- $177,500,000

1967 -- and for each fiscal year thereafter -

$225,000,000

The funds are in addition to the 55 million dollars which were provided by the previous vocational education acts. This is going to mean a very substantial increase in programs of vocational education since for each Federal dollar spent in the past, States and local communities have spent about $4.50. This did not include expenditures for land, buildings and equipment.

We are pleased to know that the new Act authorizes expenditures of funds for the construction of area vocational education schools. This is going to be very helpful in connection with the providing of technician training in agricultural occupations.

The new Act amended the George-Barden Act as follows:

> any amount allotted (or apportioned) under such titles, Act, or Acts for agriculture may be used for vocational education in any occupation involving knowledge and skills in agricultural subjects, whether or not such occupation involves work of the farm or of the farm home, and such education may be provided without directed or supervised practice on a farm;

There are many other provisions in the Act that you will want to study carefully. One of these refers to periodic reviews which must be made of vocational education programs. This requirement makes it advisable for us to consider the development of programs of evaluation as we plan new instructional programs.

As we move forward to broaden and to enlarge the field of vocational education, let us not forget that these programs have served the Nation well since 1917. During the past year four million students, of whom half were adults, enrolled in classes of vocational education. Two-thirds of the high schools of the Nation offer one or more courses in the field of vocational education.

Today we face many problems in providing technician training in agriculture. We are fortunate to have you men assist in solving some of these problems. We are pleased that studies are being made in 42 States to determine the various agricultural occupations that exist. An attempt is also being made to find out the competencies that are needed and the number of individuals who should be trained for these agricultural occupations. A number of these studies have already been completed. Some will be reported on at this Seminar. These studies will serve as a firm foundation for launching sound programs of technician training in agriculture.

It appears that there will be a task for most of us to do in connection with technician training in agriculture. High schools, junior colleges, technical schools and agricultural colleges will all find that they are needed to assist in providing training. It is not yet known how many courses and types of courses will be needed. In some cases one course may prepare persons for technical jobs in agriculture for an entire State. In other situations it may be necessary to offer courses in many centers.

The studies are providing proof that agriculture is a broad and complicated field. Agriculture includes production, processing, marketing and servicing. Technical jobs both on the farm and in other agricultural occupations are increasing. The use of new machines, chemicals, fertilizers and new techniques both on and off the farm are making new opportunities in agriculture for personnel adequately trained to serve in this broad field. The courses offered in manpower training for the preparation of farm workers in the field of agricultural technology show that there are many opportunities for placement of well-trained persons on farms. There is a need for technicians to prepare farm ponds, to assist with drainage and irrigation, to assist in installation and maintenance of automatic feeding equipment and in the performance of many other important farm activities. It is likewise being found that persons with advanced training in agriculture are needed in centers that distribute products to farmers. In the processing of farm products there is a growing need for technicians. Our task is challenging. I am pleased that we are accepting this challenge.

Dr. Taylor has asked me to discuss with you some of the responsibilities of State staffs in implementing agricultural technician programs. I suggest the following for your consideration:

1. Each State should obtain facts about the need for technician training in agriculture. Studies that have been made should be reviewed. Other studies may be necessary. We have the opportunity to obtain valuable assistance from many sources. The State Department of Agriculture has much information on technicians in agriculture. Other agricultural agencies can be of help. Associations such as the Farm Equipment Institute, the National Florists Association, the Professional Forestry Association, the National Arborists' Association and the Turf Managers Association can be of much help. We have been working with these associations at the national level. The Farm Equipment Institute, which serves 200 farm machinery firms, has volunteered to assist us in the development of programs of education which can prepare persons for entry into the farm machinery field. They are in a position to assist in evaluating studies, to help determine training needs and to assist in the preparation of appropriate literature that will stimulate students to enroll in courses designed to prepare for these fields. A number of these associations have already made estimates of the number of persons they will need in the near future. They have also informed us of some of their needs for upgrading of persons already employed. We must work closely with these and with other associations.

2. In order to provide the services on the State level which are needed, it will be necessary for State staffs either to employ new personnel or to assign new responsibilities to existing personnel.

3. The need for training in each State must be analyzed carefully. Consideration must be given to both immediate and potential needs.

4. The number, types and locations of proposed training programs for technicians must be determined. This can only be done after careful analysis of occupational needs.

5. As soon as training needs are determined, plans should be made to provide the vocational education programs needed. As an illustration, persons who prepare for entry into a local farm machinery distribution center may need training in agriculture, salesmanship, record keeping and perhaps in the major overhauling of farm machines.

6. Use a consulting committee. Representatives from appropriate fields in the community may be in a position to help plan and evaluate the new programs of vocational education. They may be glad to share in the promotion and in the designing of programs. We must involve others.

7. Direct the preparation of course outlines. Some work is already being done on the national level in the development of course content outlines. We need to work together in the development of many additional course outlines. It is inefficient and unnecessary for each local teacher to develop a complete course outline for certain courses that may be taught in a similar manner throughout the Nation. Outlines have already been prepared for training forestry technicians and for the training of landscaping aides.

8. See that necessary facilities, equipment, and supplies are available. The new programs are going to need new types of facilities and equipment. It will be necessary to help provide the right types of equipment and facilities so that effective instruction may be given. In some cases, if machines are too expensive for purchase, it may be possible to provide participation experience by leasing such equipment or by arranging placement for occupational experience with firms that own such equipment.

9. Obtain instructors. This is going to be very difficult in some areas. A number of States are finding it difficult to employ enough teachers of vocational agriculture education to meet the needs of local communities. It will be necessary to plan new types of programs to train teachers for the broad field of agriculture. Many States will have to employ persons who possess the necessary skills and then give them some teacher education while they are at work. This has been proven effective in other vocational fields.

10. Develop quality programs. As we strive to provide training for those who will become technicians in the field of agriculture, let us also emphasize the importance of quality programs. These programs call for superior instructors, good equipment and appropriate occupational experience wherever possible.

11. Inform the public. We have the task of informing the public about the new Vocational Education Act and about the new programs of education in agriculture which may be launched. Adequate information can help individuals to recognize the need for training and to understand the opportunities that exist. These are essential steps in the obtaining of enrollment for courses which may be offered.

12. Evaluate programs. Let us remember that Congress is expecting systematic evaluation of vocational education programs. Let us develop adequate plans to determine the placement records of students and plans for follow-up so that we may be able to determine the effectiveness and value of these training programs. Our placement in the past records has been excellent.

13. See that needed guidance is provided. The need for occupational guidance in the field of agriculture is greater now than it has ever been before because of the complexity of the agricultural industry. In addition to providing guidance for students and prospective students, teachers of vocational agriculture should assist school guidance counselors by making available appropriate information about opportunities for employment in farming and other agricultural occupations.

14. Assist in providing placement and follow-up of graduates. Even though major responsibility for job placement of graduates is in the hands of the Government Employment Offices, teachers of vocational agriculture can be of much help to students in obtaining satisfactory placement. We must strive to encourage teachers to keep in touch with former students who are placed so that we may help to determine the effectiveness of the instruction and the additional training needs of these persons.

We face the future with confidence. We can look back with pride on the achievements of vocational education in agriculture since 1917. By careful study, such as is being given this week to the problem of technician training in agriculture, and by the use of the findings of appropriate studies, we are in a position to move forward aggressively and with confidence. We are grateful to all those who have gathered here at this seminar to assist in the design of these important technician training programs.

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GUIDELINES FOR THE DEVELOPMENT OF TRAINING PROGRAMS FOR AGRICULTURAL TECHNICIANS

by
Joe R. Clary
Consultant, Vocational Education
North Carolina

I am very honored to be asked to make a presentation to this very distinguished group of agricultural educators from throughout the nation. Dr. Taylor and his staff are to be congratulated on another very excellent seminar if the rest of the week lives up to the fine first day - at least to this point.

Some of my most valuable professional experiences have been had through seminars and workshops and conferences sponsored by our National Center. I think it is one of the finest things we have. Let's all become enthusiastic supporters and work toward expansion and greater support for our Center.

Today I have been asked to report to you briefly on a recently completed study concerned with the development of some tentative guidelines for the development of training programs for agricultural technicians. This study was completed during this past year and used as a dissertation study here at Ohio State. Two copies of the study have been made available to Dr. Taylor for use in this seminar. I want to pause here briefly to thank Mr. Warren Weiler, State Supervisor here in Ohio; his staff; and the Division of Vocational Education for making available a research assistantship which helped make this study possible.

Need for the Study

The need for this study was predicated on five points:

1. The rapidly changing occupational structure in the United States has resulted in a critical shortage of technicians, including agricultural technicians.

2. The total educational system has failed to develop sufficient programs to prepare the increasing numbers of technicians and semi-professional personnel needed.

3. Vocational educators in a number of states have indicated that programs for the training of agricultural technicians will be developed in their states within the next five years.

4. No previous studies dealing with the development of agricultural technician training programs could be located by the investigator--at least as reported in Summaries of Studies in Agricultural Education. Attention was given to two California studies, those of Jerry Halterman and Mt. San Antonio College.

5. No guidelines specifically developed for planning and conducting agricultural technician training programs could be found.

Major Purpose of the Study

The major purpose of this study was to develop guidelines for use in planning and conducting agricultural technician training programs.

Objectives of the Study

Three specific objectives were identified to guide the direction of the study:

1. To determine the status and characteristics of present agricultural technician training programs.

2. To determine, for a number of categories, the degree of emphasis administrators of present agricultural technician training programs believe should be given to certain procedures in developing successful training programs.

   You will see these categories in the visualized material a little later.

3. To synthesize, refine, and evaluate a tentative set of guidelines for use in planning and conducting agricultural technician training programs.

Scope of the Study

This was a national study limited to the 48 contiguous states of the United States. Public institutions at the post-high school level, excepting four year colleges, with organized curricula designed for the preparation of agricultural technicians constituted the universe of the study.

Methodology Used

The idea for this study grew out of an extensive study of the literature concerning the changing occupational structure in the United States and the surge of agricultural occupations other than farming and ranching and from discussions with several leaders in agricultural education.

As the idea grew and a definite need for such a study was established, a further review of the literature was made with emphasis on technician training programs. From this review the investigator synthesized a tentative list of guidelines and supporting statements.

A small group of educators was selected to help with initially refining and modifying the tentative list of guidelines for submission to a larger national jury for further refinement and evaluation.

The investigator carefully selected a national jury of experts and asked them to evaluate the tentative guidelines and supporting statements according to the extent to which they believed each guideline and/or supporting statement important to the successful development of agricultural technician training programs. I am very pleased that five of the eight vocational education members of the jury are here today.

State directors of vocational education in the 48 contiguous states in the United States helped identify public post-high school institutions, excepting four year colleges, with organized curricula designed for the preparation of agricultural technicians. Many of the institutions represented in the study are represented here today.

The United States Office of Education and published educational directories were also helpful in identifying institutions used in the study.

Instruments were prepared by the investigator to secure data on the status and characteristics of present agricultural technician training programs in the institutions identified by the state directors. A structured procedures check list was developed, scaled and used in recording the degree of emphasis the institutions believed should be given to certain procedures in the development of successful agricultural technician training programs.

Visits were made by the investigator to a limited number of institutions with agricultural technician training programs.

The investigator used the literature on the development of agricultural technician and other technician training programs, the evaluations of the tentative guidelines by the jury along with their additions and other comments, the study of the status and characteristics of present agricultural technician training programs, the reactions of the institutional representatives as to emphasis which should be given to procedures in the development of such programs, and the information and ideas gained while visiting some of the institutions as a basis for refining the tentative set of guidelines for the development of agricultural technician training programs.

I could talk all night on facets of the study but our main concern today is: What are some of these guidelines the literature, institutional representatives, and the jury said were important in developing agricultural technician training programs?

GUIDELINES FOR THE DEVELOPMENT OF TRAINING PROGRAMS FOR AGRICULTURAL TECHNICIANS

Section I. Objectives

GUIDELINE: Agricultural technician training program objectives should reflect the unique characteristics of technical education of less than the baccalaureate degree, but above the high school level.

Therefore:

a. The objectives should be such that resulting curricula are primarily occupation-centered and planned toward occupational competence for the graduate.

b. Clearly defined and realistic objectives for the training programs should be developed under the guidance of a professional educator assigned to give leadership in this area.

c. Lay personnel in agricultural businesses and industries should be involved in the development of objectives for agricultural technician training programs.

d. A major objective of the training program should be to prepare the student for immediate productive employment in the technician occupations for which training is provided.

e. The objectives should allow for preparation of students for clusters of related technician occupations.

f. The objectives should be in harmony with the legal bases on which the institution was founded.

g. ____.

Section II. Types of Programs Offered

GUIDELINE: The types of agricultural technician training programs to be offered should be determined with primary but not exclusive attention to occupational (job opportunity), educational and interest surveys of people and industries to be served.

Therefore:

a. An advisory committee including representatives of the agricultural businesses and industries should help carefully plan any surveys made.

(1) The main purpose to be served by each survey should be determined before instruments for it are developed.

(2) The precise information desired should be determined and instruments developed to assure its being obtained.

(3) Sufficient funds and/or time should be budgeted for making the surveys.

(4) A well-qualified person to direct the survey should be carefully selected.

(5) The sources of information should be carefully selected.

(6) Consultant help in field research should be obtained in developing the survey plan and guide.

b. Extensive and dependable information and data are needed, including:

(1) The identification of jobs or occupational clusters dependent upon agricultural technician training programs.

(2) The types and number of employment opportunities currently available and those realistically expected over a given period of time.

(3) The amount of support employers will give to the program.

(4) Other available sources of education and training for the particular area under consideration.

(5) The number of potential students who are now interested and would enroll in the program.

c. The survey findings must be carefully analyzed to determine what agricultural technician training curriculums should be established.

(1) Specialized consultant help should be secured in analyzing and interpreting the survey data.

(2) Advisory committees should be involved in analyzing and interpreting the survey data.

d. ____.

Section III. Curriculum Content

GUIDELINE: Curriculum content for agricultural technician training programs should be closely related to present and future occupational needs.

Therefore:

a. Curriculum content should be primarily occupation-centered.

b. A balance between technical-supporting content and class-laboratory experiences is essential for learning concepts and principles and their application.

c. Preliminary drafts of curriculum content should be developed through a study of the present and future job requirements in the occupational fields selected and the allocation of the required knowledge, skills and understandings to courses of instruction.

d. The depth and scope of mathematics and science must be tailored to occupational needs of those enrolled.

e. The difficulty level should be such that it can be mastered by a reasonably high proportion of the students within the time limits of the curriculum.

f. The curriculum should be flexible enough to be easily revised as needed in advance of the changing competencies of the technician.

g. Curriculum content should be planned with advice, counsel and support of the agricultural industry for which the training program is being developed. Other agricultural education leaders should also be involved.

h. The curricula for the agricultural technician training programs should be coordinated with the total institutional program.

i. ____.

Section IV. Recruitment

GUIDELINE: A planned recruitment program should be developed to acquaint prospective students with the opportunities for becoming trained as agricultural technicians and for employment upon successful completion of this training.

Therefore:

a. The recruitment program should include activities with the following groups:

(1) High school counselors, teachers, and administrators.

(2) High school students.

(3) Agricultural industries, businesses, and associations.

(4) Parents of high school students.

(5) Other agricultural organizations and agencies.

b. Specific responsibility for giving leadership to recruitment activities should be assigned.

c. Personal contacts with individuals and/or groups of prospective students should be made and maintained.

d. Emphasis in recruitment activities should be based upon fitting the talents and interests of the prospective student to the technician job.

e. Recruiting efforts should clearly show how the training program is essential to securing a job as a technician.

f. ____.

Section V. Student Services

GUIDELINE 1: Selection. Selection of students for agricultural technician training programs should be based on interests, aptitudes, previous education, intellectual capacity and background experience - the criteria varying with the occupations for which training is given.

Therefore:

a. Prospective students should be interviewed and appraised with respect to personal traits, physical handicaps and the like in relation to the job of technician.

b. Policies and procedures for student selection should be carefully developed to assure admission of only qualified students.

c. Only those applicants who have a reasonable chance of success in the training program should be admitted.

d. Self-selection by the prospective student should be a significant part of the selection process.

e. An adequate testing program is important in selection.

f. ____.

GUIDELINE 2: Counseling. Institutions providing agricultural technician training programs should develop an adequate counseling and guidance program, coordinating it with counseling programs of local schools.

Therefore:

a. Counseling services should be made available for the following levels of counseling:

(1) Counseling prior to enrollment.

(2) Advisor counseling regarding courses, requirements, study techniques, student organizations and the like.

b. A trained guidance counselor should be provided to give leadership to and coordinate guidance activities.

c. The counseling and guidance service should provide the following:

(1) A placement service.

(2) A vocational information service.

(3) A follow-up and research service.

(4) A counseling service.

d. ____.

GUIDELINE 3: Placement and Follow-up. Placement and follow-up services in agricultural technician training programs should result in graduates being placed in the jobs for which they were prepared and also provide information for proper analysis of program effectiveness.

Therefore:

a. An organized and well-planned placement service should be made available to graduates of agricultural technician training programs.

b. Placement personnel should have extensive contacts with agricultural businesses and industries.

c. Records of employment are essential and should be used for analyzing program effectiveness.

d. Good relationships with prospective employers of graduates should be developed long before actual placements are made.

e. Institutions preparing agricultural technicians should locate desirable placement opportunities for graduates.

f. Up-to-date placement records should be kept for use in public relations, recruitment and counseling.

g. ____.

GUIDELINE 4: Residence Facilities. Residence facilities should be made available for students enrolled in agricultural technician training programs when sufficient need is demonstrated based on the opportunity of students to obtain programs of their choice which are not available to them otherwise and when the addition of these facilities serves as a means to enable the institution to more fully meet its objectives.

Therefore:

a. The following factors should be considered when determining whether residence facilities should be provided:

(1) Geographic location of the institution.

(2) The possibility of placing agricultural technician training in an educational institution within commuting distance.

(3) The institution's objectives.

(4) The number of students needing housing.

b. ____.

Section VI. Library

GUIDELINE: Students enrolled in agricultural technician training programs should have ready access to a well-organized, appropriately coordinated library which provides a ready reference to up-to-date information and which has an appropriate range of authentic and professional publications in the area of work for which technicians are being trained.

Therefore:

a. The institution library should be readily accessible for use by students in the agricultural technician training program.

b. The library should be well-equipped with:

(1) Technical periodicals in agriculture.

(2) Reference books.

(3) Technical publications developed by manufacturers of agricultural equipment.

(4) Pertinent agricultural research bulletins (both publicly and privately sponsored research).

(5) Pertinent government publications in agriculture.

c. ____.

Section VII. Instructional Staff

GUIDELINE: The instructional staff in agricultural technician training programs should have technical occupational competence in the area for which training is offered and should understand and be proficient in teaching skills and competence essential to successful performance as an agricultural technician.

Therefore:

a. Potential instructors should have adequate backgrounds of technical training, technical experience and appropriate teacher training.

b. An adequate number and variety of instructors should be provided.

c. Adequate funds should be provided to meet the competition of industry for the talents of qualified personnel on the instructional staff.

d. In-service training should be provided for the instructional staff.

e. The agricultural technician teacher:

(1) Should be able to establish rapport with students.

(2) Should know how to teach technical subjects.

(3) Should be proficient in applicable manual skills and the use of tools.

(4) Needs a thorough knowledge of the principles and laws of science and mathematics.

(5) Should be a perpetual student as well as mentor.

f. ______________________________.

Section VIII. Facilities and Equipment

GUIDELINE: Adequate and appropriate facilities and equipment are essential and should be made available in the training of highly competent agricultural technicians.

Therefore:

a. In the planning of all facilities, the objectives of the program should be kept in mind.

b. An adequate number of various types of well-equipped classrooms should be provided.

c. Facilities and equipment should be available for the student to learn to use the precision instruments, the hand and machine tools, materials, processes and operations involved in the technician occupations for which training is given.

d. Equipment lists should be derived from the content of the courses of study which make up the curriculum.

e. Laboratories should be well-equipped for extensive use for testing, research, experiments and so that instruction can be based on the application of a particular science to industrial processes.

f. ______________________________.

Section IX. Acceptance

GUIDELINE: Planned and continuous efforts should be made to increase the acceptance and prestige of technician occupations (including agricultural technicians) and technician training programs.

Therefore:

a. Close and continuous contact with industry is desirable.

b. Counselors, other educators and parents should be educated to the fact that technician education is not a "second best" education.

c. The institution should develop and maintain good community relations.

d. "Satisfied customers" should be used to increase acceptance of the program.

e. Planned efforts to increase prestige of technician occupations and technician training programs should be made.

f. An associate degree or other appropriate form of recognition should be awarded graduates to increase the status of the program.

g. ______________________________.

Section X. Evaluation

GUIDELINE: Continuous and planned programs of evaluation should be characteristic of agricultural technician training programs.

Therefore:

a. Program evaluation should involve students, graduates of the program, employers of graduates, potential employers and others.

b. Adequately planning for continuous and comprehensive evaluation is an integral part of program planning.

c. Evaluation procedures should provide for objective evaluation of both the processes and the products of agricultural technician training programs.

d. Evaluation should be concerned with the future as well as the past and present.

e. ____.

Section XI. Accreditation and Licensing

GUIDELINE: Agricultural technician training programs should become accredited and/or licensed as early as possible by a recognized accrediting or licensing agency in order to assure the public that some kinds of recognized standards are being met and to protect graduates from pseudo-technician graduates.

Therefore:

a. Copies of the criteria for accreditation and/or licensing should be secured as early as possible and efforts made to meet them.

b. ____.

Section XII. Location

GUIDELINE: Agricultural technician training programs should be located in institutions in areas of population and agricultural industry and business concentration so as to be readily accessible to those whom they are designed to serve.

Therefore:

a. The program should be located where similar type training is not already offered by other institutions in the area.

b. Location of the program should be made only after a survey of need, interest and resources is made and evaluated.

c. The institution in which the program is located should lend itself to serving a commuting population of a number of full-time students.

d. The program should be located in an area where students might get first hand observation of and/or work experience in the cluster of occupations for which the training is being given.

e. ____.

I have copies of the guidelines and supporting statements for distribution at this time. Please do not look upon any of these as sacred or final. They are not. At best, they are only tentative. My fondest hope is that each of these will be improved upon before you leave here on Friday afternoon.

I certainly do appreciate the wonderful attention you have given me and wish for each of you a very rich professional experience while you are here.

Thank you very much.

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THE LABOURERS ARE FEW

by
Wesley P. Smith
State Director of Vocational Education
California

Few professional honors surpass the one accorded me today: The opportunity to appear before my own branch of the vocational education family--in a national setting--and to discuss a matter that has both functional and symbolical significance for our program. Functional, because we must at once shape our actions to accommodate a new, additional task in agricultural education. Symbolical, because the manner and the spirit with which we perform this task will certainly predict our ability to cope with other challenges sure to emerge in the future.

Our common mission is to confer on the preparation of agricultural technicians. My own portion of this discussion involves the leadership responsibility of state staffs in this new enterprise thrust upon us by the technological surge in the industry we have long served.

The title I have given this statement, "The Labourers Are Few," is not intended to be subtle. Instead, it proposes an indictment for our efforts to date. In Luke 10: 2, we read: "The harvest truly is plenteous, but the labourers are few." The need for technician training pervades all of agriculture. It is a need that is both diverse and urgent. It is a need that cannot be compromised. It is a need, however, that has not yet attracted more than perfunctory interest by our profession. In all the land there are but a handful of practitioners in this segment of vocational education in agriculture.

Others much more capable will describe the nature of technician training, the extent of measurable need for such training, and the wherewithal necessary to conduct such training. The remainder of my comments will be limited to the responsibilities and the obligations we have in providing leadership to the development, the conduct, and the evaluation of such training.

At the outset, I must indicate my prejudice and my single theme today by commenting that my version of true leadership will not permit operational involvement. In other words, whether we be state supervisors or teacher educators, our leadership in technician education is both subverted and diluted every time we become operationally entangled in its development. If I were to identify any single factor that has served as a deterrent to the evolutionary and orderly development of agricultural education, it is our traditional predilection to enmesh our energies and our minds in the operational phases of the program we lead. We can't seem to resist the temptation to actually perform in the band in addition to waving the baton. Think hard on this accusation--whether it be in error or not. I challenge you to take off your frocks of participation when you become leaders. And I suggest that it isn't merely physical involvement about which I speak, but also the manner in which we continue to permit our thoughts to be so engaged in the operational machinery that there is no time for the free-thinking so essential in true leadership.

I choose to dwell on this fascination we in agricultural education seem to have for actual program involvement. It is because of this preoccupation we seem to have for the operational aspects of our program that we have created a sterile vacuum of profunctory leadership instead of producing a stratum of enterprising leaders who, by stubborn resolution, have disengaged themselves from the whirlpool of program action. Lest you think too ill of this proposition, answer for me--and for yourselves--the failure of the most wonderful leadership development opportunity--the program of agricultural education--to produce leaders for our total profession in the number proportionate to the opportunity. And think long and hard of the thousands of young men who rise majestically through the continuum of youth groups, agricultural colleges, teacher training, and teaching, only to reach a plateau strewn with potentialities suppressed by a helpless intoxication caused by emotional attachment to the operating phases of agricultural education. What I am saying, in so many words, is that the very nature of the program that produces boundless leadership potentiality is being permitted to destroy that which it produced!

I dwell on this matter for a purpose. Somehow, for some reason or other, as already noted, leadership in the development of technician training in agriculture has been somewhat less than adequate to date. The reason is not that our leaders in agricultural education are incompetent. Instead, it seems to be due to the fact that we, as leaders, have not seen the need for such training even though we are watching the program constantly. We watch--but we do not see! And this blurred vision is common with us, not only in technical education, but in many other aspects of our program where the lockstep of tradition is apparent.

Although such probing is painful, I choose to use this opportunity to examine further the role we serve. Leadership begets leadership, and here today we have a substantial segment of the leadership in agricultural education. If we can learn to assess objectively the total span of agricultural education for the purpose of locating its strengths and weaknesses, its gaps and its duplications, we begin to perform as leaders. If we can recognize instinctively the full spectrum of the current and future training needs of the giant industry we serve, we have an essential basis for leadership. If we can stand off and indiscriminately take the dimensions of tasks that need to be fulfilled, we show talent for leadership. And when we clear the focus on all of these factors and can then design the strategy and promote the efforts that will result in the development of operating programs keyed to all these ingredients, without ourselves getting entangled in the machinery, we have become true leaders.

Before returning to specific leadership needs in the preparation of agricultural technicians, I suggest that we give heavy thought to the need to learn better the actual function of leadership. The role of leadership in any aspect of human endeavor grows increasingly complicated. Competency in leadership is always relative, and so it becomes essential that those who would provide leadership in any field must possess equal or greater talents for leadership than do those who are to be led. Our profession has become more and more sophisticated. Our profession has adopted higher and higher standards. Our profession serves at all educational levels. Our profession has a full spectrum of specializations. It becomes an easy matter to suggest, therefore, that leadership in our profession requires a many-faceted array of talents heretofore not essential.

All job requisites continue to spiral upward, and so it is with the job of leadership. In real truth, the competency of leadership can no longer be left to chance through the pick-up method. The talents of leadership must be developed systematically, through organized instruction, through experience, and through precept. In passing, I must express the selfish thought that the National Center for Advanced Study in Agriculture could find few projects with greater potential than that of leadership development. And I must also challenge the great collegiate institutions all over the nation to do likewise.

Now let's take a closer look at the role we should assume as leaders in agricultural education in this matter of preparing agricultural technicians. Based upon the philosophy of leadership expressed at such length already, I have the notion that the supervisorial staff in agricultural education at the state level have the initial responsibility to assess the degree of need for such preparation. This is not a unilateral determination, of course. The assessment is made in cooperation with the industry, with other governmental agencies serving the industry, and with the operational segments of agricultural education in schools and colleges. A "dip-stick," so to speak, is used to obtain readings of need. This is no process for amateurs--and it is not a process that should involve amateurish methods. It is a professional measurement of the dimensions of a known or suspected need. The technique of assessment will not countenance undue influence by antagonistic emotions or by inherited tradition. It permits no side-stepping or procrastination.

It seems to me that here with the current national attention upon technical education in agriculture, we have a working example of the need for true leadership. Either there exists a need for the specialized preparation of agricultural technicians or there is no need. Widespread indices say there is. The staging of this national conference is one index.

All right, what shall we do? Wait for someone else to develop a prototype? Reject the whole matter out of hand? Launch into an operation, full-bloom, overnight? Transfer the responsibility to another agency?

Or shall we sensibly, systematically, thoroughly examine the entire proposition --for the purpose of finding the factors that will lead to the next judgment--what shall be our course of action?

And must we, ourselves, perform this measuring function? I think not. Perhaps it would be better if we did not. In the first place, there are no doubt those who can perform the actual measurement better than we. In the second place, our decisions might be unduly influenced by the process of examination, thus jeopardizing the objectivity of our later judgments. And, too, involvement in the leg-work of such activity characteristically detracts from other leadership services we should be rendering.

Let us now assume that the need has been verified. Here, again, true leadership is tested, because now the task is to meet the need to develop a program.

And, once again, the temptations to become operative abound. Shall we, as state staff members, perform this task? Shall we design the curriculum? Shall we establish the specifications? Shall we determine who will teach? Shall we decide the nature of the equipment?

And, again, I say no. Inability to resist this temptation has been our downfall in the past. Through such operational activity, we become committed to the program--to the details--we have helped to develop. In doing so, we sterilize our ability to made objective evaluations.

So, let's farm out this task. And, again, I suggest that there are others who are more competent to find these answers than we! There was a time when our personal attentions were necessary but this is not the situation today.

Finally, when these determinations have been made, we arrive at that point where actual programs are to be inaugurated and conducted. I suppose that it is in this phase that we are less tempted to be operational. Nevertheless, we often are unable to resist the vicarious involvement that finds us emotionally tied to the actual operation. It may well be that such emotional involvement is just as distractive to leadership energies as physical involvement.

My theme today has little variety. It has a reoccurring note. It says that if we are to be leaders in agricultural education we must revolutionize our technique of leadership. And in the development of technical education we have a case in point. I express the conviction that the industry we serve abounds with need for technicians. I stipulate this need. Yet, with all of our glorious history, we have neither anticipated nor recognized this need. As a result, the industry has been denied some of the proficiency it needs. And our profession has been denied an attainment it deserves. I suggest, too, that this industry we serve abounds with other needs for specialized preparation, on both a pre-service and an in-service basis that likewise goes unnoticed by us--and unserved by us.

Let us use the agricultural technician as a practice device to break out of our shell of seeming indifference to new training needs--an indifference influenced by faulty leadership practice, not by deliberate intent. Let us recognize that, as state staff, our fascination with operational involvement has produced calluses on our mental antennae that dull our sensitivity.

As state staff, let us use this single aspect of new service to both develop our leadership technique and to demonstrate the manner in which our program of agricultural education can accommodate new training demands.

As state staff, let us back off from the chores of operation and contemplate from a distance both the program we lead and the industry we serve. From such a vantage point we can be more flexible in our thinking and in our performance.

As state staff, let us set about the deliberate improvement of our leadership competency.

As state staff, let us disperse to others the details that tend to smother our inventiveness, our enthusiasm, and our inspiration.

As state staff, let us start today--using technical education in agriculture as our new proving ground.

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DETERMINING NEEDS FOR AGRICULTURAL TECHNICIANS

by

Lloyd J. Phipps
Chairman, Department of Agricultural Education
University of Illinois

Agricultural Technicians--A Definition

The first task in determining the need for technicians who must have technical abilities in agriculture is defining the terms, technician and agriculture. Both terms are in a period of transition as to meaning. Until a few years ago, a technician was a person who had great skill or knowledge regarding the techniques of some process. A technician, according to Webster could be an artist, a musician or a writer. In recent years the meaning of the term was narrowed, by many, until a technician was limited to a person supporting a professional worker in one of the several fields of engineering. This undue limiting of the fields of work of technicians, in my opinion, was due, at least partially, to the passage of the National Defense Education Act. Very recently many persons have recognized that the meaning of the term has been unduly restricted and that we could have technicians and should have technicians in many areas of work.

In our Illinois study, Technical Education in and for Rural Areas, we did not define a technician so narrowly that he was limited to the engineering fields. A technician was defined as a semi-professional, highly skilled worker who could be differentiated from both the professional person and the highly skilled worker. A technician is located midway between the skilled person and the professional person in the developmental structure of jobs, in his work performance, and in his educational attainment. The jobs of most technicians may be traced to recent applications of scientific and technological knowledge in the production and distribution of goods and services. The technician must have the ability to perform many high level skills in his field of work. His success also depends on his understanding of scientific principles and his ability to apply these scientific principles in solving problems of modern design, production, distribution, and service. Thus, in any field of work that has both professional level personnel and skilled workers, it is theoretically possible to have technicians.

In our Illinois study, Technical Education in and for Rural Areas, it was also necessary for us to define agriculture. If agriculture is more than farming, what is it? We decided that agriculture involves more than farming plus the input and output services for farming. It involves many things that are not usually considered as even related to farming and the input and output services for farming. As an operational definition, we decided that we were interested in any technical level job requiring a person with knowledge and skills usually taught in courses in:

1. Plant science
2. Animal science
3. Economics of agriculture
4. Agricultural education
5. Rural sociology
6. Entomology of agriculture
7. Horticulture
8. Floriculture
9. Soils
10. Food technology
11. Forestry
12. Landscape architecture

Incidentally this definition was adopted prior to even the first draft of the Vocational Education Act of 1963.

Determining Needs

With the preceding definitions we can perhaps communicate regarding the need for technicians with agricultural competencies. If we plan to establish educational programs for technicians who must have technical competence in agriculture, and I assume this is why we are interested in determining needs, we must find answers to many questions. A few of these questions are:

1. Are technicians needed with technical competence in agriculture?
2. What agricultural competencies do these technicians need?
3. Where would these technicians work and under what conditions?
4. How many of these technicians are needed?
5. What are the job opportunities for technicians with technical competence in agriculture?
6. What specialized, technical education do these technicians need?

There are at least four ways of attempting to obtain answers to these questions. They are:

1. Conduct new studies and reanalyze previous studies.

   We have underway and have conducted many studies regarding job opportunities in occupations requiring workers with knowledge and skill in agriculture. If we were to analyze or reanalyze the data from these studies, we could obtain much information regarding the need for technicians with technical competence in agriculture, and the opportunities for gainful employment for such technicians. I maintain that we have more information about the need for technicians with technical competence in agriculture than we realize. We probably have as much information as any other subject matter discipline regarding the need for technicians. We have this information because of the foresight of researchers in agricultural education and because of the encouragement of studies in this area by the Agricultural Education Branch, Vocational Education Division, U. S. Office of Education. Walter Arnold, A. W. Tenney, Duane Nielsen and others are to be commended.

   Additional studies will need to be made. I will discuss some of my ideas regarding these studies later.

2. Obtain the assistance of professionals in the various disciplines in agriculture.

   Byrl R. Shoemaker has stated that it may be possible to establish technician education programs in any area where the professionals in that area want the assistance of technicians. We in agriculture have probably given inadequate attention to the solicitation of help from professional workers in agriculture. They can help us answer the six questions posed earlier. They can also help us plan educational programs for technicians. Without the support of professional workers it may be very difficult to establish technician education programs.

   After our study at Joliet, Illinois, Max Kuster, vocational agriculture teacher, informed me that the local veterinarian had become enthused about the prospect of preparing technicians to assist the veterinarians. In some other sections of Illinois, we encountered apathy and even opposition from veterinarians. We must obtain their support and help. The best way of obtaining their support is to involve them in studying needs and in planning programs to meet these needs.

3. Observe existing programs of technical education designed to prepare workers with technical competence in agriculture.

   Unlike some occupational areas we have had considerable experience over many years with agricultural education programs at the technical level. We have not identified them in all cases as technician programs, but that is what they are. This past year I prepared a partial summary of these programs. I can supply you with this summary if you desire it. We should capitalize on the successes and the failures of these programs. We do not have to learn everything about technician education the "hard way."

4. Plan and conduct pilot or experimental studies.

We cannot learn everything we need to know by conducting surveys, analyzing previous research, involving professionals and studying existing technician education programs. We will never get technician level education involving agriculture "off the ground" unless we start pilot programs. Pilot programs are also needed to capture the imagination and attention of the populace regarding the need and potential in technician education for persons who must have technical competence in agriculture.

Illinois Technical Education Studies[1]

Allow me to inform you regarding our studies pertaining to technical education for persons who must have technical competence in agriculture. Approximately two years ago we started a study entitled, Technical Education in and for Rural Areas. This research project involved more than a study of technical education for persons who must have technical competence in agriculture. Today, however, I will only discuss the aspects of the study pertaining to technical education in agriculture. I believe that we have some information about the need for technical education that is different from the information being obtained in other studies. Our information is no better than the information other researchers are obtaining, but it is different because of the objectives and methods of our study.

At the beginning we assumed that we could not identify in advance where persons would be working that needed technical competence in agriculture. We also assumed that the job activities of workers would give us many leads regarding the technical education in agriculture that technicians need. We further assumed that we needed to discover the job activities of agricultural technicians in order to learn what other technical competencies were needed in addition to the technical competencies in agriculture. In other words, we were interested in technical education and not merely agricultural education. A technician with technical competence in agriculture who lacks the other technical competencies he needs will not be prepared for gainful employment as a technician.

Because of these assumptions we selected a random sample of all businesses, excluding farming, in a fourteen county rural area. We found jobs that needed persons with technical competence in agriculture and we found these jobs where we expected them and also where we did not expect them. If we had preselected certain types of businesses to study, we would have missed some technician level jobs that required workers with technical competence in agriculture. In your studies, we urge you to study all businesses and to select these businesses at random. Unfortunately some of the studies that have been conducted will have limited value because the businesses or jobs selected for study were not selected at random.

In June, 1964, we published a preliminary report that presented our basic data. Our next report will present curriculums for preparing technicians who need technical competence in agriculture. The basic data provide, we believe, the information needed for developing these curriculums. Copies of the report of the basic data are available, but we believe that the next report on curriculums will be of considerably more value to practitioners.

A very abbreviated report of some of the findings of the study follows. For the business firms in areas of the region studied with population centers of less than 25,000, the following estimates apply to all workers requiring post-high school education in agriculture:

7,803 workers were currently employed
5,490 workers had been employed during the past 5 years due to business growth and employee turnover
3,536 workers will be needed in the next 5 years due to business growth
1,673 workers will be needed in the next 12 months due to business browth and employee turnover

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[1] Staff studies involving Lloyd J. Phipps, A. H. Krebs, Paul Hemp, J. Robert Warmbrod, and Gerald R. Fuller

Thus, for each 100 workers currently employed:

70 workers had been employed during the past 5 years due to business growth and employee turnover
45 workers will be needed in the next 5 years (growth)
21 workers will be needed in the next 12 months (growth and turnover)

For each 100 workers requiring knowledge and skill in agriculture who were employed at the time of the study in areas with population centers of less than 25,000, it was estimated that:

10 were working as technicians
50 were working in jobs which required some post-high school nontechnical education
21 were working in jobs which required post-high school nontechnical education
19 were working in jobs which required high school graduation only

For agricultural businesses in areas of the region studied with population centers exceeding 25,000, the following estimates apply to all workers needing post-high school education in agriculture:

1,241 workers were currently employed
680 workers had been employed during the past 5 years (growth and turnover)
398 workers will be needed in the next 5 years due to business growth
181 workers will be needed in the next 12 months (growth and turnover)

Thus, for each 100 workers currently employed in agricultural businesses in population centers in excess of 25,000 for the region studied:

55 workers had been employed during the past 5 years (growth and turnover)
32 workers will be needed in the next 5 years (growth)
15 workers will be needed in the next 12 months (growth and turnover)

For each 100 workers who needed knowledge and skill in agriculture and were employed at the time of the study in agriculturally oriented businesses in areas with population centers exceeding 25,000, it was estimated that:

28 were working as technicians
39 were working in jobs which required some post-high school technical education
7 were working in jobs which required post-high school nontechnical education
26 were working in jobs which required high school graduation only

A factor analysis of knowledges required in agriculturally oriented businesses indicated that the agricultural knowledges needed clustered into factors which I have named as follows: (You may want to give them other names.)

1. Agricultural Business, Animal Science
2. General Agriculture, Plant Science
3. Agriculture Business Mechanics
4. Soils and Mechanics
5. Agricultural Management
6. Agricultural Construction
7. Agricultural Engineering

We found that persons aspiring to high level jobs in the following types of businesses need the greatest breadth of technical agricultural education.

1. Agricultural supply and service companies
2. Pest control businesses

We also found that many of these workers needed competencies other than technical competencies in agriculture.

With this information, we obtained the cooperation of Joliet Junior College in establishing a two-year agriculture supply curriculum to prepare high level workers for agricultural supply businesses. It will be a four semester program with the last semester devoted to trainee employment in jobs. The trainees will be supervised by a teacher competent in technical agriculture and competent in the organization and management of agriculturally oriented businesses. He will also conduct a seminar for the trainees during the fourth semester. Max Kuster, vocational agriculture teacher at Joliet Junior College, will be in charge of the program. He will have the assistance of two other vocational agriculture teachers, one being hired especially for this program, plus the other technical teachers employed at Joliet Junior College.

The curriculum follows:

First Semester

Courses	Hours
Communicative Skills I	3
Introduction to Agricultural Supply Businesses	3
Retailing of Agricultural Supplies	3
Agricultural Economics	3
Survey of Political, Social, and Economic Problems	4
Physical Education	1
Total	17

Second Semester

Communicative Skills II	3
Chemistry of Agriculture	3
Agriculture Mathematics	2
Conservation of Natural Resources	2
Principles of Feeding	3
Survey of Political, Social, and Economic Problems	4
Physical Education	1
Total	18

Third Semester

Agricultural Chemicals and Supplies	3
Agricultural Business Management	3
Crop Production	4
Salesmanship	3
Agricultural Supplies Handling	2
Agricultural Records and Reports	2
Physical Education	1
Total	18

Fourth Semester

Advanced Agricultural Seminar	6
Agricultural Business Experience Program	12
Total	18

Summer Program Between 1st and 2nd Years

Agricultural Seminar	3
Agricultural Business Experience Program	6
Total	9

The pilot program will be studied at Joliet continuously. If the problems encountered can be overcome, additional programs will be started in future years.

Two programs that have been discussed tentatively are (1) technical education for ornamental horticulture workers and (2) technical education for agricultural equipment workers.

Summary and Conclusions

The Illinois studies, the studies in other states, and the existing programs of technical education for workers who must have technical competence in agriculture have established the need. Professional workers in agricultural education should, therefore, do the following:

1. Continue to study the need for technicians with technical competence in agriculture. These studies should investigate the specific competencies in agriculture needed by technicians instead of focusing almost total attention on the global needs of technicians in agriculture.
2. Recognize that technicians who need technical competence in agriculture usually also need technical competence in other disciplines.
3. Enlist the aid of educators in other disciplines in preparing technicians who must have technical competence in agriculture so that the technicians prepared will be able to obtain gainful employment.
4. Involve the professional workers in agriculture in planning technician level programs.
5. Conduct local studies as a means of assuring local people of the need for technician education in agriculture and in other disciplines.
6. "Earmark" funds for research relating to technical education of workers who need technical competence in agriculture.
7. Involve all people or their representatives in studies, program planning, and evaluation relating to technical education in agriculture.
8. Establish pilot programs as rapidly as possible. The time has come to divert some of our time and funds away from studies of global needs. We need to devote more of our efforts toward pilot programs where we are forced to make detailed studies of specific needs.

PANEL:
PROBLEMS IN ESTABLISHING AN AGRICULTURAL BUSINESS TECHNOLOGY PROGRAM

Moderator: R. C. S. Sutliff
Chief, Bureau of Agricultural Education
New York

H. B. Drake
Coordinator of Agri-Business Technology
Springfield and Clark County Technical Education Program
Springfield, Ohio

R. O. Brinkman
Director of Technical Education
Springfield and Clark County Technical Education Program
Springfield, Ohio

Charles W. Whitney
Executive Director
Farm & Power Equipment Retailers of Ohio

Warren G. Weiler
Head State Supervisor of Agricultural Education
Ohio

Presentation by Mr. Drake

Agri-business technician training is a relatively new experience for us. Many attempts have been made to define the agricultural technician; we have made several ourselves; and the more often it is tried the less sure we become that a description is possible. Our program at Springfield was designed to meet employers' needs in specific fields--a need that could be met with less than a four-year college program --but one that was not being met by any existing program. Whether this conforms to the accepted concept of a technician or not is debatable, but we in agriculture may have the privilege of establishing new concepts. Certainly we are placing less emphasis on technical courses in agriculture than engineering programs are placing on technical subjects in their field. We are placing more emphasis on sales and management skills than is done in other technical programs.

Our stated objective in this pilot program was to develop key personnel for the areas of:

1. Feed and farm supply sales & purchases;
2. Marketing farm produce - grain & livestock;
3. Selection, use and application of farm chemicals, including fertilizers, insecticides & herbicides;
4. Seed selection & use.

A key person is being interpreted as one who is willing and ready to assume some responsibility, demonstrate initiative, and possess such skills as will enable him to make a worthwhile contribution to a business and its customers.

It is anticipated that graduates will be employed in sales positions, as assistant managers expecting to grow into management, as field men for companies in the four areas listed or in some comparable capacity doing contact work with farm people.

We are now in the process of organizing the second pilot program - one in agricultural equipment. While this program was developed with an entirely different advisory committee than the original agri-business program, the aims are to do much the same for the agricultural equipment businesses as we are doing for the four areas mentioned in the first pilot program. We are not training mechanics. We are preparing a more skilled worker.

The course of instruction is two years in duration, with 25 hours class time per week and 36 weeks each year. This time is divided as follows:

1. Basic laboratory experiences:
   A minimum of 15% of the total instruction time is devoted to basic laboratory or manipulative experiences in the appropriate area.

2. Related technical subjects:
   A minimum of 50% of the total instructional time for the programs is devoted to technical agricultural subjects. This particular area is being interpreted broadly and includes the phases of agricultural training future employers indicated they desired in the trainees.

3. Communicative & leadership subjects:
   A minimum of 20% of the total instructional time is devoted to development of skills in oral expression, increasing rate of reading, writing business letters, advertising techniques, conducting meetings, human relations, supervisory techniques and many other leadership skills.

4. Remainder of time distributed according to need:
   The remaining 15% may be used in any area a particular group may need to emphasize.

In developing specific courses to include in the above divisions, many contacts were made with potential employers. They were asked what type of jobs they would have available for technicians and what training they would like for them to have. This information was brought before the advisory committees on a state level and curriculums built on the basis of their recommendations.

Course outlines were developed with the hope that everything taught would be useful to the individual, in later employment. Maintaining this concept in the minds of those doing the teaching has been one of the major problems. Since we are not a part of any college or university we cannot draw upon teaching personnel from these sources. We must rely on those we are able to find in our local area who are willing to teach part time or on those employed full time by the technical school which in Springfield consists of programs in Business Data Processing, Mechanical Engineering and Electrical Engineering, in addition to the two programs in the agricultural related fields. We have been fortunate in locating some very well trained individuals for our program. As needs increase, securing adequate teaching personnel may present a problem. Salaries offered are not attractive enough to encourage people who have had business experience to work with us on a full time basis. Much time will need to be spent in keeping teachers teaching what is meant to be taught. It would seem most desirable for all teachers in these programs to have some agricultural experiences in addition to their formal training.

Since this program is a State Department of Education one, we do not choose students. We only insist they must have graduated from high school, have a farm background, be physically qualified to enter the occupation for which training is offered, and present sufficient evidence of maturity and initiative to profit by the instruction. Each applicant is interviewed before acceptance primarily to be sure he understands the purpose of the program and that his desire for training corresponds to our objectives.

Classes in each area will enroll no more than 25 nor less than 15 in each section and will meet in afternoon and evening sessions. Enrollees are encouraged to accept placement in a field of employment of their choice between the first and second years. There is no "co-op" program; however, field laboratories and observations along with seminars provide an integral association between the school and agricultural businesses. Employers' interest to date would indicate placement after graduation would present no problem for those whose level of achievement in the program is satisfactory. In fact, one of the problems could well be getting enrollees placed too soon, before they have completed the program. An effort is being made to work with businesses using students between the first and second years to see they encourage completion of the program.

Our experiences the first year would indicate it most desirable to have students with much maturity. This does not necessarily mean advanced years. However, we have found those a few years removed from high school graduation are very desirable students, having a definite purpose in attending the program and a sincere desire to accomplish something. Some time may need to be spent in creating such desire in those less mature. Sincerity of purpose is most desirable from the standpoint of succeeding in the program and certainly employers arelooking for that characteristic.

It is my personal opinion that there is a great potential in training programs such as these. First, many young men will be provided with an opportunity to make a contribution to agriculture they would not otherwise enjoy and if the programs are kept employer oriented, many agricultural businesses will be provided with key employees that will prove profitable to them.

Presentation by Mr. Brinkman

I plan to discuss some of the administrative considerations in initiating an agricultural technology program.

Expense of Operation

All technologies require operating expenses that are approximately twice as much as their liberal arts counterparts. Equipment, low pupil-teacher ratios, and staff specialization account for the majority of the higher costs; however, overhead, supplies, extended service, and maintenance can also be expected to be higher than in conventional, general programs. Agricultural technologies are not an exception to this rule.

Fiscal Procedures

Any new program should thoroughly examine the requirements of budget appropriations, reimbursement policies, and existing financial statutes under which it must operate. Old statutes, regulations, and policies may require clarification by an attorney general, a state auditor, or a board of tax appeals....any one of which can cause extended delays in initiating a program that is seemingly simple to operate. New programs and old laws are not necessarily compatible.

Recruiting Competent Teachers

The salary competition from private enterprise and other institutions is recognized as the major problem in recruiting staff. It should not be overlooked, however, that other factors such as facilities, equipment and working conditions are examined carefully by prospective faculty members.

The administrator must recognize the individual differences of his staff and build to its strength. Each teacher must complement the other in response to a common challenge. Recruitment should not overlook this if a balanced staff is to be assembled.

Departmentalization, as an organizational technique, is helpful but is limited where total enrollment cannot justify the expense caused by a very low pupil-teacher ratio. On the other hand, one teacher per section is inadequate for technical curricula. An excessive teacher load and demands for comprehensive excellence in multiple disciplines will neither attract nor retain competent instructors.

Status and Role

The status of liberal arts programs and the lack of understanding of technical curricula programs by students, parents and counselors requires intensive orientation and public relations efforts on the part of administrators of technical education.

Agricultural or any other technical programs beyond high school transcend mere manipulative skill development. They are para-professions requiring no less than the capacities of the average high school graduate and strong motivation. They are not static nor can they become so if they are to meet the needs of their students.

The dynamic role of technical education must be communicated to those it can, should, and does serve.

Initiate and Refine

The advice of experts, the observations of consultants, and the conclusions of studies are helpful in initiating a program of technical education. They will not, however, provide all the answers to all the problems of a specific program. Nothing will be accomplished if all problems must first be overcome before a program is initiated. The administrator must expect to make mistakes and be prepared to make adjustments. Perhaps the biggest mistake of all would be to expect otherwise. Do the best you can....but do it!

Presentation by Mr. Whitney

I noticed that it is hot outside. This means it is summertime in the U.S.A. Summertime in the U.S.A. means it is time for travel--time for travel on roads and by-ways, many of which are new experiences for most of us.

This bit of philosophy can be symbolic of the topic you are here to discuss this week. The development of technician programs in agriculture is a new venture for many. Let's approach this new endeavor with the same enthusiasm that we would the summer vacation trip.

The new program of technical education is a new approach for both you, as educators, and the individual industries you will be serving. Thus, it is that we find two parties on the new highway of experience. Educators will find they must (and should) consult with the industries who will use their students. Industrial people will want to assist in program development so that the students will be valuable to them as employees. At first, both will have fear of the other. Both will have to learn that together they can accomplish much.

There must be a period of acquaintanceship. There must be effort on the part of both parties to accomplish this important step. We must work together. We must know each other's problems. We must recognize that in the valley between us is the secret to success in technical education.

There are challenges for both sides to consider. Educators will find it necessary to keep abreast of the constantly changing industrial picture. The elements of supply and demand, new selling patterns and modern merchandising methods will be constantly challenging teachers and administrators as they outline courses and prepare materials for teachers to use. New management trends will quickly but definitely terminate old theories. The students you will be preparing for productive work will be working in the future. We must give them tomorrow's approach to industry's problems if they are going to be productive in future years.

Businessmen will be challenged to project their needs for the future. This applies particularly to personnel needs. Since these schools will be providing better trained men than they have ever hired before, employers must also realize the need for adequate pay to lure these men to their operations and keep them satisfied as they mature and grow with experience at work. These same businessmen must realize their obligation to help in every way with the training of these young men. They can and must do this with placement training stations, as seminar leaders, and by offering equipment and industrial materials to help the trainees do a good job at the completion of their training.

Properly developed, this program can build the prestige of the educational system. This will be accomplished through actually training men to do a productive job of work upon completion of the school period. This program can help improve the total community by making better people, people who will be more productive in business as they use the talents they have acquired from a broadened and improved educational system.

Presentation by Mr. Weiler

Technical schools give us a splendid opportunity to involve local people, people from the agricultural industry. They are in an excellent position to advise us in regard to the number of employees who need knowledge and abilities in agriculture and the type and extent of training needed. Furthermore, we hope they will employ our product. Also, they can be of real assistance in recruiting students and in providing training stations, if they are needed in the training program.

Advisory committees for agricultural technician programs may be composed of representatives of cooperatives, feed and grain dealer organizations, livestock dealers, and finance organizations. Representatives of appropriate professional groups and of the college of agriculture also should be included. In Ohio one of the first decisions with which they assisted was the identification of clusters of agricultural occupations for which employees were to be trained. These occupational areas were farm elevators and similar establishments, farm equipment dealerships, horticulturally oriented businesses, agricultural laboratories, resources conservation, and farm management.

Following this the committee assisted with the decision that the first technical school in agriculture would be designed to train employees for farm elevator and/or feed and supply centers. The committee then assisted, as a group and individually, in determining the training program and the staff and equipment needed, and in publicizing the new program for preparing technicians in this area.

Other committees are assisting with plans for technical schools to train employees for farm equipment dealers and food processing concerns. It is highly essential that we work closely with those in the industry as we must have a close working relationship with these leaders.

Unfortunately, the employment opportunities frequently are not to be found in the communities where the students reside. This presents problems in determining how the programs are to be financed. Again, committees can be of help in providing part-time employment for students who cannot commute. Finally, employer representatives are in an excellent position to assist with the evaluation of programs and the agricultural technicians they will employ.

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A GUIDE FOR CURRICULUM DEVELOPMENT FOR EDUCATING AGRICULTURAL TECHNICIANS

by
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Mt. San Antonio College
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Statement of Purpose

The purpose of this paper is to develop a guide for curriculum development for agricultural technicians. This is a rather timely subject because there is much national interest in this type of curriculum. The author has been concerned with the development of such a curriculum at Mt. San Antonio College, Walnut, California, for the past two years. Since it is a new program, there is a definite lack of specific information on the subject. It is hoped that the guide suggested in this paper may be of use to others in agricultural education or in other areas of vocational education.

Limitation of Problem

Curriculum may be defined in many ways. It may be defined as "The total effort of the school to produce desired outcomes" or "A sequence of experiences which have been set up to discipline children and youth in group ways of thinking and acting."[1]

The curriculum proposed in this paper will not cover such problems as staffing, financing, and counseling. They will be mentioned only occasionally, but this does not mean that they are not important. Time and space do not permit their inclusion at this time.

This paper is intended to show the development of the course of study, resource units, and teaching units. It does not include the final step in curriculum development, which is the preparation of individual course outlines and lesson plans by the teaching staff. These can be developed by the teachers who actually use this as a guide or framework.

In the paper, suggestions will be made for determining needs and objectives, and selection and organization of content for technical and general education. Some emphasis will be placed on selection and organization of learning experiences, as the author feels that this is one of the main areas where new thinking is needed by those involved in vocational education. The suggestions on evaluation will tie in with objectives and learning experiences. However, since the technical programs are new, the methods will necessarily be based on theory rather than practice.

What Is a Technician?

Prior to 1963, considerable confusion existed regarding the correct definition of a technician. The term has been used very loosely for many years, and people who were called technicians had a wide range of educational background. This was especially true in the engineering field where men doing technical jobs, but having less than four years of college, were called engineers. Actually, these people were not professional engineers, but were technicians. In other jobs, there are workers with Ph.D.'s who are called technicians.

Some confusion exists in industry because of job titles. Some jobs are given prestige titles which seem to far exceed the educational preparation for the job. For example, a janitor might be called a "sanitary engineer". It appears that one of the jobs of the educator is to help convince society that all work is honorable, no matter how menial the task. The prestige of a job should come from the education needed and the pride of doing the job well, rather than in the title. Some implications for counseling exist here and will be discussed later in the paper.

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[1] Hilda Taba, Curriculum Development (New York: Harcourt, Brace, and World, Inc., 1962), p. 9.

The agricultural technician has been related to technicians in other areas of the labor force. One of the first attempts to define him was done in a study made by Jerry Halterman at Modesto College in California. In his study, he defines the technician as "an individual who through an extended period of specialized training beyond high school, but less than that required for a B.S. degree, in the field of agricultural science and those areas of instruction which support it (training may include, but not be limited to, courses in business education, language arts, mathematics, engineering, physical science, and social science) has acquired the skill and ability to make practical applications of theoretical knowledge in performing specific tasks in the production of goods and services in agriculture."[2]

The agricultural technician must be educated to be able to perform mental (cognitive) skills in such activities as servicing, repairing, maintaining, reporting, building, controlling, supervising, operating, testing, diagnosing, and investigating. He should be able to exercise good judgement and discrimination in making decisions on predetermined standards, do limited organizing and planning, be able to collect, examine, and interpret plans, designs, and data, and determine actions to be taken on the basis of analysis.

In addition, he must be able to perform the manual skills involved in the trade or profession. This involves the use of tools, instruments, and/or special devices to design, illustrate, fabricate, maintain, operate, and test objects, materials, and equipment. This means that he must in reality be able to do the manual skills of the skilled worker in addition to the mental skills mentioned.

The place of the technician in industry, then, is above the skilled worker and below the professional worker. The technician will usually work under the supervision of a professionally trained worker. The need for this type of worker has been pointed out by the National Association of Manufacturers. In their publication on technicians, they point out that "an industry needs an average of between five and seven technicians for every one professional engineer."[3]

Diagnosis of Needs

If the junior college is to be a true community college, the faculty and administration should use all means in an attempt to anticipate, recognize, and serve the educational needs of that community. This may be done in several ways, but one of the best ways to do this in the area of vocational education, is to use a lay advisory committee. The advisory committee for agricultural education should be composed of lay leaders from the various fields of farming and agribusiness represented in the community. The California State Department of Education has published a guide for the establishment and conduct for local advisory committees. They point out that "the committee is only advisory in character, and that its advice is for the board of trustees to accept or reject."[4] Other recommendations for the formation and function of the committees are found in the publication. Perhaps the main thing to remember is that these are lay people and are not professional educators. Therefore, the part the committee should play in curriculum development should be primarily to help determine needs in the community. These leaders, who are working in the various fields of agriculture, can be of great assistance in telling where shortages of labor exist, and the type of education needed for those who are to fill these jobs. If necessary, temporary subcommittees can be formed and other people from industry can be brought in for meetings as the need arises.

After as many meetings as are necessary are held with the advisory committee, a broad idea of needs should be apparent. The committee should have helped determine the areas of occupations that need further study. A plan should then be formulated to survey these areas to gain additional detailed information. Several decisions must be made concerning the way in which the survey is to be conducted, such as who will do the work, whether it will be a personal survey, or done by mail, which companies are to be surveyed, and to whom the survey should be addressed. Usually, school personnel do not have time to conduct surveys in addition to their other duties. In some cases, if the survey is not too extensive, it can be done by school personnel with the aid of the advisory committee members. School administrators should be prepared to give released time for faculty and staff to do this type of work. There is much value to the school when these surveys are done properly. Since research by other agencies is lacking, it almost becomes a necessity for the school to complete such surveys on its own. Fortunately, funds will be available to schools to help with this procedure under the new Vocational Education Act.

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[2] Jerry J. Halterman, "Three Curricula for Training Agricultural Technicians at Modesto Junior College," Agricultural Education Magazine, Vol. XXVI, No. 5, November, 1963), pp. 20-24.

[3] National Association of Manufacturers, Your Opportunities in Industry as a Technician, An Education Aid (New York: National Association of Manufacturers, January, 1957), pp. 7-8.

[4] California State Department of Education, A Guide for Establishment and Conduct of Local Advisory Committees for Vocational Agricultural Departments (Sacramento: State of California, October, 1963), p. 5.

The author recommends that when a local survey is conducted, that it be done in two parts. The first part should be completed by talking to prospective employers in the selected industries. The employers can furnish valuable information on future trends in employment needs and on the type of individual they wish to employ. Unfortunately, the author has found by personal experience, that employers sometimes tend to be over idealistic in their educational requirements and job analysis. In such a survey, conducted in 1962-63[5], it was found that some employers listed certain jobs as requiring a B.S. degree. Upon further investigation of these jobs, it was found that the actual work performed was not at a level requiring four years of college. In a society where we are short of highly trained professional people, it is unfortunate that people with college degrees are used to perform menial tasks that could be done by a technician.

The second part of the survey should be performed by talking to the employees who are actually doing the jobs which have been defined by employers in the first part. This part of the survey should consist of actual interviews with as many of these people as possible, in order to get an objective analysis of their various duties. An attempt should be made to find out what actual mental and manual skills are used in the daily performance of their jobs. Whenever possible, it is also desirable to list the various equipment used in the performance of these duties. This becomes very helpful in deciding what equipment is needed in the laboratories to train these future employees. The personal interview is recommended rather than a mail survey. In a mail survey, it would be necessary to define "technicians" as used in the study. This is more easily done in a personal interview. By this method, it is easier to get to the proper people to interview. Also, a greater return can be expected from a personal interview than by mail. Finally, the interview helps eliminate preconceived notions or terms by the person preparing the survey. For example, a new term, "agricultural mechanization" resulted from the information gained during a survey by the author. Prior to the survey, the farm equipment mechanics part of the educational program was usually referred to as farm mechanics. It was found that those interviewed considered that the term farm mechanics included food processing machines, and others used off of the farm. Had the term farm mechanics been listed on a mail survey form to be checked by employers, it is doubtful that his interpretation and that of the educator would have been the same. Therefore, the real needs of the industry might not have been reflected in the final curriculum.

Formulation of Objectives

After the completion of the survey, a close analysis of the findings should be made to determine what course of action to follow. Some decisions on objectives will be necessary before the curriculum is established. At this stage of curriculum development, every effort should be made to include the actual teaching faculty in the discussions and planning. If the people who are to do the teaching help develop the objectives, the possibility of them being more realistic and actually accomplished will be enhanced. Also, without well defined objectives, it becomes more difficult to evaluate the results.

On the statement of objectives, one of the first decisions to be made is how broad the program is to be. In the study made at Mt. San Antonio College, over fifty kinds of technicians were identified in the public service alone. The question arises then whether you are going to attempt to develop a curriculum to educate for all of these occupations or for the few that may seem to be in greatest demand. The analysis of the data from the survey may show that there are common areas of knowledge that can be used for several kinds of technicians. If the decision is made to plan a narrow curriculum for certain types of technicians, then will some adjustment by students be possible if plans change or occupational opportunities change?

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[5] G. Allen Sherman, Technicians in Agriculture (Walnut, California: Mt. San Antonio College, 1963), p. 6.

At Mt. San Antonio College, the broader philosophy has been adopted for the initial program. Perhaps some job competence at the beginning of a career will be sacrificed to give the student a broader base to help him advance on the job later. The broad objective then should clearly spell out what type of behavior is expected. As we recall from the definition of a technician, he will need to know mental and manual skills. The objectives should clearly state whether we are talking about an understanding, competence, knowledge, or appreciation. At Mt. San Antonio College, one of the objectives for the plant science technician was to teach the skill of operating seed separation equipment. Rather than select only one type of machine, we selected four types, each of which operates on a different principle. Students are expected to learn how to use each machine and then are presented with a mixed sample of seed to separate as they decide. The objective here is not just to teach the operation of machines per se, but also to teach principles of seed separation. With the rapid advance of technology, the machines will change and the theory of transfer should operate so that the student can adapt to new situations or machines without requiring retraining in school. The previous example illustrates a second principle of formulating objectives so that the learning experience necessary to achieve them are defined. For many years, we have been primarily concerned with teaching manual skills. The learning experiences here are not necessarily conducive to conceptual thinking or problem solving.

A third principle to consider in formulating objectives is in terms of continuity of growth over a period of time rather than terminal points for a specific grade or activity. By starting with the more general and proceeding to the more specific, the work can become more difficult and education can be given in depth in certain areas. If some natural selection is to take place in the program, all students who attempt it will not succeed. As students advance through the program, the mastery of simple skills should be replaced by the more abstract problems involving critical thinking.

A fourth principle to be considered is that of making the objectives realistic and obtainable. In a two year program in junior college, we cannot expect to have all graduates arrive at the same level of competence. Individual differences will be apparent and students entering the college will come with a wide variety of backgrounds and experiences. Some will have farm backgrounds and some not; some will have had vocational agriculture in high school, and some not. The open door policy in California junior colleges means that anyone can enter who has graduated from high school or is eighteen years of age. This brings up the matter of standards for the program and what type of selection will take place. At Mt. San Antonio College, the staff has been considering the development of some kind of testing program to use as a counseling device. If this is done, then this procedure will have an effect on the objectives that we can expect to attain.

In summarizing the attainment of objectives, the first consideration is the breadth of the program. At Mt. San Antonio College, the decision was made to start with three general types of technician training. These were Plant Science, Animal Science, and Agricultural Engineering. The staff felt that there were common areas of objectives for all three programs and that some core curriculum could be developed which would be common to all three. From this core curriculum, the student can then advance into the area of specific training for the type of occupation that he chooses. Another advantage of this broad approach is that it allows the student some time to make a choice. Most students do not know enough about what jobs are available or what program to follow when they enter as freshmen. The curriculum is being planned to allow students to do project work in the laboratories just as the production majors do on the farm. This will help give individual instruction in depth to those who wish or need it. Our main overall objective of the technician program is to teach the student enough skills (mental and manual) to be able to begin on a job and advance on the job. So far, the objectives of the general education part of the curriculum have not been mentioned. These have purposely been omitted here, as a section on general education will be covered later in the paper. Once these ultimate general objectives have been established with the help of the teaching staff, then more specific goals can be established by the staff for individual courses as they are planned.

Part of the evaluation process would then be to determine if the individual goals for each course in the curriculum are contributing to the overall objectives of the program.

Selection of Content

After the survey has been completed, then any necessary follow-up should be made by calling in additional people from industry or making calls to the various plants. The results should then be a rather comprehensive list of mental and manual skills which should be included in the curriculum. In addition, there should be some information on concepts and types of problem solving that need to be covered. Course content in this section will deal only with technical education. General education will be discussed under a later section, as will learning experiences.

Some variation will exist in the stages of curriculum development, depending upon whether a whole new program is being established in a new school, or whether the technician program is being added to an existing program. Decisions will have to be made to determine whether existing courses will meet the needs for the technician, and, if not, what changes will be necessary.

Perhaps the best way to demonstrate the selection of course content is to show how it was developed at Mt. San Antonio College following the survey for public service technicians. The procedure shown here will be offered as a guide only, and is not necessarily considered to be the best or only way. The survey showed that in the public service area, there were many types of technicians which could be classified under the general heading of plant science. The following list shows the types of jobs identified and is not necessarily meant to be a complete list:

Agricultural Research Technicians
Biological Laboratory Aide
Soil Conservation Aide
Forestry Aide
Junior Shipping Point Inspector
Laboratory Technician
Gardener
Agricultural Biological Technician
Pest Control Technician
Park Ranger
Park Naturalist
Plant Quarantine Inspector
Plant Pest Control Inspector
Inspector's Aide (raisins)
Processed Fruit and Vegetable Inspector's Aide
Inspector of Economic Poisons and Fertilizer
Seed Inspector
Agricultural Standardization Inspector
Seed Potato Certification Inspector
Sampler - Grain and Commodities
Nursery Inspector
Rodent and Weed Control Assistant
Field Crop Inspector
Field and Orchard Inspector
Standardization Inspector
Rodent and Pest Animal Control
Weed Control
Apiary Inspector
Turf Grass Technician
Quality Control Technician
Agricultural Sales Technician
Agricultural Landscape and Nursery Technician

As you can see, there are thirty-two types of jobs listed here and the list has been enlarged some since the survey. It should become very obvious that a separate curriculum cannot be set up to educate each type of technician. This is why the staff took as its objective the attempt to establish a core curriculum which would include the content which would be similar for several types of technicians.

The next step was to list the various subjects, ideas, skills, concepts, etc. that were suggested during the survey by both employers and employees. These are included in the following list:

Conservation - Soil and Natural Resources
Forestry - Fire Control
Wildlife Management
Agrostology
Agricultural Occupations - job descriptions, opportunities, education required, job interviews
Fruit and Vegetable - variety, identification
Entomology
Pest Control - vertebrate, invertebrate, use of insecticides
Biology
Agricultural Economics
Plant Propagation
Plant Identification - trees, shrubs, groundcovers
Irrigation and Drainage - sprinkler systems, friction losses
Plant Diseases
Weeds and Weed Control
Soil Science
Landscaping
Business Management - human relations, personnel management, record keeping, budgets, labor laws, social security, workman's compensation
Agriculture Inspection - grades, standards
Agricultural Mechanization - two and four cycle engines, turf equipment, value of equipment - costs, food machinery, hydraulics, electric motors, welding, surveying, drafting, blueprint reading, material handling
Bacteriology - sterilization, slide making, identification, staining
Chemistry - manipulative skills, measurement of weights and volume, concentration, density, titrations, acids, bases, ph, specific gravity, use of hydrometer and refractometer and other instruments
Farm Management
Agronomy
Geology
Poultry Husbandry
Agriculture Sales and Service
Fertilizers - costs, rates, proper use, methods of application

Other recommendations were made concerning general education and types of learning experiences. These will be covered later.

As can be seen from the list, the suggestions were many and varied. Some were very specific and some were more general in nature. The next step then is to evaluate the data to see what to include in the curriculum and where to include it. The example shown here only covers the plant science technician program. It should be pointed out, however, that some of the same content is common to the animal science and agricultural engineering curricula, also.

Our first step at Mt. San Antonio College was to hold a staff meeting of the instructors who would be teaching the existing and any new classes. At this meeting, any content suggested in the survey that was already included in an existing course was eliminated, but a note was made as to which technicians would need this course. This step eliminated such suggestions as entomology, agricultural economics, plant propagation, plant identification, irrigation and drainage, plant diseases, weeds, soil science, landscaping, farm management, agronomy, geology, poultry husbandry, agricultural sales and service. These courses were already in the curriculum, but some changes were indicated. Irrigation and drainage, for example, was treated more from the farm standpoint. The turf grass technician needs to know about sprinkler systems (regular and automatic), and installation of systems, including friction losses in pipe, and the use of clocks and tensiometers. The decision to be made was whether to add a new course or incorporate this material into the existing course by eliminating something. The final decision has not been made by the staff. This will be determined, probably by enrollment. If sufficient enrollment in the turf grass program warrants a new course, it probably will be added. There are other problems in courses such as entomology. The present entomology course has been primarily one in taxonomy. This was deemed inadequate to accomplish the desired objective. A new course has been planned to cover both vertebrate and invertebrate pests and their control. This new course in pest control will deal more with the practical aspect of controlling pests than with mere identification. This course will be offered in addition to entomology.

It should be noted that the list of needed subjects includes some biology, bacteriology, and chemistry. The emphasis here was upon manipulative skills, use of scientific instruments, relationships, and applied science. The transfer student would need the regular courses in these subjects, but the technician does not need the full course. He does not need the theoretical as much as the practical or applied science. For this reason, a two semester course was added, called agricultural science. This course is designed to cover the needs suggested by the survey, and will be one of the core courses for most technician majors.

The survey revealed many areas in agricultural mechanization that are not commonly covered in the traditional courses in farm mechanics. The data indicated that the mechanics part of the curriculum for the technician needed a new approach toward machines used in processing as well as new types of machines used on the farm and in agricultural industry. As a result, a one semester course in farm machinery was dropped, and a new one, titled agricultural mechanization, was added.

The survey indicated a need for some business management. Since Mt. San Antonio College already has a curriculum in agribusiness, it was not necessary to add new courses in this area. Perhaps in some schools these suggested topics could be taught in the business education department, where this seems desirable.

In the past, few junior colleges have offered curricula which included courses in forestry, conservation, and wildlife management. The survey revealed that a need has evolved in this area of work for the two year graduate. This has been brought about by the greatly expanded use of our national forests for recreation purposes, and by the increased use of farms and ranches for recreational purposes. Those interviewed during the survey indicated a definite trend for increases in personnel in these jobs. It was necessary for us to add courses in conservation, forestry and wildlife management.

Some courses had to be dropped in order to add the new ones suggested in this paper. The courses dropped were primarily those in the art of agriculture. These have been replaced with courses which stress applied science in agriculture and, to a lesser degree, the business of agriculture. This approach seems justified in view of the decreasing farm population and the increasing number of jobs in agricultural science and business.

Once the content of the curriculum has been determined, then some thought should be given to sequence of content. This is necessarily tied very closely with the learning experiences planned. There are some problems involved in scheduling that may affect the desired sequence. In a small department, it may be impossible, due to staff limitations, to offer every course each year. Therefore, a curriculum that is established to offer a given sequence for two years will work for students who take it in that sequence. In most junior colleges, however, the new class of freshmen each year outnumbers the sophomores and those entering during the fall of the second year would be coming into the program in reverse order.

In order to make the sequence as desirable as possible, it may therefore be desirable to offer at least the core courses each year and others on alternate years. As will be pointed out later, a balance will be needed between technical and general education work each year. The courses recommended to be offered each year are: agricultural science, soil science, agricultural mathematics, agricultural mechanization, and agricultural sales and service. These were found to be basic to all three technical programs. By offering these courses in the first year, the skills and principles should be taught also in other classes and in individual project work.

General Education Courses

To this point, the curriculum development can be done primarily by the agricultural staff. However, this does not imply that the counseling and other departments should not be informed of what has been taking place. Other departments and the administration should be kept informed of the planning procedure from the beginning. Their advice and counsel should be sought whenever needed. However, the agricultural staff is qualified and should do the majority of planning of the curriculum which deals with technical education.

At this stage of curriculum development, a curriculum committee representing the college should be called together. The composition of this committee might vary from school to school but a suggested committee might consist of representatives of the following: office of instruction, evening division, library and audio-visual, admissions, registrar, student personnel and counseling. In addition, the chairman of the English, history, psychology, and math departments should be included. At this meeting, problems concerning budgets and new equipment for the addition of new courses should be presented. The librarian is included, as new books and possibly audio-visual equipment will need to be purchased. Evening division personnel will be interested in any short courese, evening or summer courses that may be proposed.

After developing the technical content of the curriculum, the next step is to develop the general education content. In the survey at Mt. San Antonio College, several recommendations were made by both employees and employers regarding general education. One of the most common comments concerned communications. Employers especially want employees who can write and speak effectively. Many of the technicians expressed the need to know how to write a clear, concise report. Mathematics also was mentioned frequently.

Under the discussion of objective, it was stated that the overall objective of the technical program was to educate the student to begin and advance on the job. As we think of additional objectives under general education, we should consider the individual as a member of society. If a good job of technical education is done, the graduate should be able to find employment and perform the necessary skills to be competent. He also needs to be able to get along with his fellow workers and others in our society. He needs to know about our form of government and how it was evolved. Since the work week is continually getting shorter, he needs to learn to employ his leisure time in an intelligent and satisfying manner. These, then, are our objectives of general education. The courses can be planned with these in mind.

Considerable variation exists in the amount of general education required by states or local school boards, and these requirements will undoubtedly have some effect upon curriculum planning. Fifteen units are required by the state and local board at Mt. San Antonio College. These include English 3, History and Political Science 6, Health Education 2, Psychology 2, and Physical Education 2. These are minimum requirements and will vary up to thirty-five units in other schools.

In addition to the courses mentioned, at least one course in mathematics should be required. The successful completion of a math achievement test might be accepted in lieu of this requirement. Some training in speech was definitely indicated in the survey. This can be given in a separate course or could be included in an English course along with written communications. Other courses might be recommended as electives, such as geology, fine arts, geography, marriage and family, or other courses of the student's own choice.

At this point, the curriculum committee needs to do considerable work on selection of course content and teaching personnel. If the teachers of the general education courses do not have a philosophy which is sympathetic toward the terminal student, they can be a real detriment to the program. These teachers should be able to accept realistic objectives with these students and put the emphasis on good teaching. The technical and general education areas are both important to the curriculum, and a good program cannot result unless there is cooperative effort between the two groups.

The general education courses should be distributed throughout the two year program with the technical education. If the general education requirements are fifteen to eighteen units, this would mean about two courses per semester. Satisfaction of the general and technical education requirements would then lead to the Associate in Arts degree.

Selection and Organization of Learning Experiences

In general, the top thirty to forty percent of the students in the junior college will be in the transfer program. Some of this group who do not desire to transfer to a four year college for some reason, will be in the technical classes. However, it is only realistic to plan on having a majority of students in the program who are not the top students in the school as measured by present standards. This fact should not be disheartening. Rather, it presents one of the greatest opportunities in the entire technician program. As educators, we are faced with the challenge of offering these students a more comprehensive technical program than has even been offered in the past. We must be aware that new knowledge and technology is advancing at an ever rapid pace, and our job is to help the students use this knowledge to find their place in society. We are faced with what Benjamin Franklin referred to as dualism in education, when he said, "It would be well if they could be taught everything that is useful, and everything that is ornamental; but art is long and their time is short."[6] We have to teach each student to be a thinking, skilled craftsman and a useful member of society.

We hear a great deal about the gifted student today, but very little about the vocationally talented student. As a result of recent studies, we are starting to hear more about creativity in students and its relationship to I.Q. In one study by Torrance, it was found that "If we were to identify children as gifted on the basis of intelligence tests, we would eliminate from consideration approximately seventy percent of the most creative."[7] We have been influenced by the measurement of I.Q. because we had the tests. We still do not have good tests to identify the vocationally talented student.

In spite of the extensive use of I.Q. tests, "Ideas regarding what intelligence or mental ability is, how it functions, and how it develops are not nearly so clear and precise as one would assume."[8] "Controversies still exist regarding the nature of intelligence on three issues. These are: (1) whether differences of intelligence are hereditary or caused by environmental factors, (2) whether intelligence is constant or modifiable, and (3) whether it is a unitary characteristic or composed of a series of specific abilities."[9] Recent research indicates that intelligence is modifiable and that new patterns of ability can emerge through control and modification of learning experiences and the educative process. New concepts also suggest that intelligence is not a unitary characteristic, but consists of a series of specific functional abilities.

It is not the purpose here to review the research on intelligence, but to suggest that many vocational educators have found students with low I.Q. in class whom they called "overachievers". These students were very vocationally talented in spite of their low I.Q. The author believes it is a vital challenge to vocational educators to stimulate new paths through the brain in an effort to fully utilize these latent abilities which we have failed to recognize for so long.

One of the first considerations in this task is to take a new look at motivation. No matter how fine the laboratory or the equipment, the desire to learn must be present. For this reason, good vocational counseling is important. Students must be kept informed on current occupational information. The sooner the student accepts a goal to work toward, the more he will be motivated. The instructor should endeavor to know the goals for each of his students and should continually relate the subject matter to their goals. Teachers also can motivate students by their non-verbal communications. A good teacher motivates his students by his actions as well as his presentation of subject matter. We should not forget that effective motivation is intrinsic.

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[6] Jerome S. Bruner, The Process of Education (Cambridge, Mass.: Harvard University Press, 1962), p. 4.

[7] Paul E. Torrance, Guiding Creative Talent (New York: Prentice-Hall, 1961), p. 5.

[8] Taba, *op. cit.*, p. 100.

[9] *Ibid.*

In the technician program, we are concerned with the teaching of skills and understanding. By doing a good job of teaching skills, we can expect some specific transfer of training where learning one skill helps the learner master a new one which may be similar. An example of this was given previously, concerning the seed separation equipment. By teaching ideas, we can expect some nonspecific transfer to take place where subsequent problems are recognized as special cases of the original idea. By helping students recognize basic fundamental ideas, we can give them greater breadth in applying them to new problems. These ideas need to be found in agriculture and presented to the students so they can learn them. Many of these basic concepts in science can be taught in agricultural science. This should be done in a practical and meaningful way. For example, the principle of specific gravity can be explained and the students taught how to use a hydrometer to determine the density of a liquid. Then the students can be allowed to work on unknowns to determine specific gravity. This knowledge should then be related to its use in industry. This might be done in a juice plant for the determination of sugar content. More study needs to be done to aid teachers in identifying the basic ideas in agriculture.

In his book on learning, Bruner shows four claims for teaching basic structure:

1. Understanding fundamentals makes a subject more comprehensible.
2. Memory is short - unless detail is placed in a structural pattern, it is rapidly forgotten.
3. Understanding of fundamental principles and ideas appears to be the main road to transfer.
4. Fundamental material taught previously should be reexamined periodically and brought up to date.[10]

Spence has classified learning and behavioral situations into six groups:

1. conditioning
2. selective learning
3. verbal or serial learning, which includes rote learning
4. learning of skills, both perceptual and motor
5. symbolic learning, including reasoning and thinking
6. social learning which involves the learning of attitudes, interests, and feelings.[11]

He points out that precise laws are available on only the first three, and only low level theories on the last three. As educators, we give much lip service to objectives in education that involve all of these types of learning. We now need new thinking on how to use all of these types to accomplish our desired objectives.

In summary, it must be remembered that there is much to cover in a short time. Students should be helped to select realistic occupational goals and subject matter should be related to these goals. The students must be taught "how to figure it" or "how to look it up". Skills should not be taught in isolation, but related to the job experience wherever possible. The subject must be made worth knowing and facts taught in a structured or connected manner that will be remembered best. Varied teaching methods, such as demonstrations, field trips to industry, guest speakers, and audio visual aids help reach these goals. The use of equipment that is currently used in industry helps the student see the value of learning how to use it. Systematic procedure should be taught with unknowns to key out or identify. When the student has completed his work, he must be expected to write a lab report in clear, concise language and then correct any mistakes.

In the laboratories, extra individual work in depth should be encouraged. Here again, motivation is important, a strong motivation such as there is with animal projects for the production students. A point of view is expressed by Taba when she says, "The most immediate and pressing demands of our age, when analyzed, will turn out to be not those for narrow vocational skills, or for easy 'social adjustment', but for a depth of understanding which will make it possible to apply the accumulated wisdom of the race to new conditions as they arise."[12] This educational task will not be easy--but yet, will not be impossible.

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[10] Bruner, op. cit., pp. 23-26.

[11] Taba, op. cit., p. 85.

Evaluation of Results

It has been pointed out that some means of evaluation are needed to determine if basic objectives are being met. Several criteria for an evaluation program will be mentioned here and suggestions made for their implementation.

Naturally, the first criteria is that the evaluation should be consistent with the objectives. Those broad objectives stated for the programs at Mt. San Antonio College were to enable the graduates to begin and advance in the occupation of their choice. Perhaps the best way to evaluate such an objective is to keep follow-up records on all graduates to see how many are successful in finding employment in the area for which they were trained. The follow-up should also be continuous in that subsequent studies are conducted in six months, one year, and five years. These later follow-up studies would be to determine if graduates did stay and advance on the job. By talking to employers, the evaluator can gain valuable information about the strong and weak points of the graduates. This information may have practical implications for curriculum improvement. These implications may fall in either the technical or the general education areas.

Another important criteria is to make every effort to assure that the evaluation is comprehensive. Surveying the employers for evaluations will provide the information just mentioned. In addition, the graduates themselves should be surveyed. These former students, if surveyed in a manner that induces a friendly and informal situation, will usually be very frank in their comments and criticisms. This type of information provides a good supplement to what the employer may have stated about the employee.

If a questionnaire is used, more graduates or employers can be reached in less time and with less cost. The main disadvantage of this method may be the percent of returns received, however. Care must be taken when using a questionnaire to see that the questions asked have the proper diagnostic value. Problems arise also from the use of a mere checklist. The checklist may not accomplish the desired results.

Another major criteria for evaluation of the program is to make sure that any testing done is dependable and valid. Effort should be made to use a pre-test, if possible, to determine these factors. If tests are administered and are not fair measurements of the objectives or learning processes used, then they are of little value.

Some of the objectives in citizenship and use of leisure time may be difficult to evaluate in a formal manner. However, when the evaluator knows his community and his graduates, he can encourage them to visit the college from time to time for a social or sports event. These personal contacts will do much to furnish this type of information on a perhaps unscientific basis, but, nevertheless, the knowledge gained is a helpful aid to curriculum improvement.

Summary and Conclusions

In this paper, the author has offered a guide that others might use for curriculum development for educating agricultural technicians. It cannot be a complete job, as curriculum development involves more than could be covered here.

The development of the need for this type of program in the junior college has been shown. These needs may vary in the different areas of the country, or even in schools within the same state. If agricultural education is to keep pace with our changing economy, these needs should be identified and met, in the various communities.

The technician has been defined as a skilled craftsman who also needs to make decisions and judgements on the job, even though he may be working under the supervision of a professional person. As has been pointed out, the agriculture industry will need from five to seven of these technicians for each professional worker.

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[12] *Ibid.*, p. 41.

The importance of a lay agricultural advisory committee has been shown. Such a committee can be of great value in curriculum planning, if used properly. Suggestions were made on the effective use of such a committee for this purpose.

The survey was discussed as a means of determining educational needs. It was recommended that the survey be done in two parts to gain more accurate information. Employers and employees do not always agree, and good information can be gained from both sources.

The importance of selection of objectives and how to select them has been pointed out. Objectives should not be static, and are subject to change as the program progresses. In order to keep objectives realistic, they should not be too high, nor too numerous at first. The objectives will have to be consistent with the teaching staff, facilities, and needs, as each of these has a bearing on the final accomplishments.

Selection of content is, perhaps, the most important step in curriculum development. It has been shown that new types of courses will need to be offered, and some former content dropped from present courses. With the rapid increase in new knowledge, there will have to be less fragmentation of courses than has been practiced in vocational education. Much thought must be given to common areas of education and development of core curriculum. Subjects that are new to many agricultural programs will need to be offered, such as agrostology, forestry, and wildlife management. If workers need education in these subjects, it seems that the agriculture department is best suited to offer such subjects.

More stress must be placed on the science and business of agriculture in these new programs. Many implications can be drawn by the teacher training institutions as it is decided who will teach these courses and how these teachers should be educated. It is questionable whether any of the four year institutions are now training the type of teachers that are needed. This new curriculum also has implications for programs involving other departments, such as life and physical science, business education, and trade and industrial education.

The importance of the teaching staff having a definite part in curriculum planning cannot be stressed enough. The final step of course outlines and lesson plans are the job of the individual teacher. He can do a much better job in this area if he has been in on the preliminary planning.

The curriculum development discussed was for a full program, including general education, and leading to an Associate in Arts degree. The general education requirements vary from school to school and state to state and may be determined by other people than the agricultural staff. The general education courses should be checked to make sure they also meet the objectives of the curriculum. This can be a problem when other departments have the responsibility for teaching these courses. Here again, it is a definite help if these departments are brought into the planning phase through a curriculum committee. This committee should discuss objectives, course content, and, especially, learning experiences. The agriculture staff must take into consideration that teachers in the area of general education may not have the same philosophy as the vocational educators toward the terminal student.

In the area of selection and organization of learning experiences, there is much to be done. Tests are needed to help identify the vocationally talented student and to find the most effective ways to teach him. The emerging ideas in education concerning the nature of intelligence and the nature of creativity, certainly seem to have implications for these new curricula. The whole area of motivation and keeping the curriculum current and meaningful are important. Vocational educators need to do much research to determine which facts and skills can be eliminated from the curriculum, or how they can be combined and structured to gain maximum transfer of training, both specific and non-specific. To gain education in depth and to teach application, new kinds of work experience programs should be developed for these technicians. Part time job placement during schooling may be desirable.

Finally, some methods of evaluation of the program must be used to determine its effectiveness and to aid in curriculum change and improvement. This evaluation should be consistent with the objectives, comprehensive enough to obtain the desired results, and yet dependable and valid.

It is hoped, then, that the ideas suggested in this paper will be of value to others who are interested in developing a curriculum for agricultural technicians. There is much to be done in the future. The need is real, and the challenge to vocational education today is great.

* * * * *

APPENDIX

Plant Science Technician

Freshman Year

Fall	Units	Spring	Units
Agricultural Mathematics AG91	3	Farm Surveying AE55	3
Soil Science SS50	3	Agricultural Mechanization AE63	3
*Truck Crops CP50	3	Agronomy CP51	3
Introduction to Agricultural Economics AB50	3	Agricultural Sales and Service AB63	3
Applied Psychology 2	2	Agricultural Science AG93B	3
Agricultural Science AG93A	3	Health Education	2
Physical Education	½	Physical Education	½
	17½		17½

Sophomore Year

Fall	Units	Spring	Units
Entomology AG51	4	Weeds and Poisonous Plants PS51	3
Plant Pathology PS50	3	Speech 1A	3
English 50	3	American Institutions 10	3
United States History 27	3	Pest Control AG94	2
*Fruit Crops	2	*Plant Science Elective	3
Agricultural Elective	3	General Education Elective	3
Physical Education	½	Physical Education	½
	18½		17½

*Turf Grass Management, Wildlife Management, Forestry, Irrigation and Drainage or Conservation of Natural Resources may be substituted.

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Animal Science Technician

Freshman Year

Fall	Units	Spring	Units
Feed and Feeding AG51	3	English 50	3
*Swine Production AG54	3	United States History 27	3
Applied Psychology 2	2	Animal Hygiene and Sanitation AH96	2
Soil Science SS50	3	Livestock Judging and Selection AH52	2
Agricultural Science AG93A	3	Agricultural Science AG93B	3
Agricultural Mathematics AG91	3	Agricultural Mechanization AE63	3
Physical Education	½	Physical Education	½
	17½		16½

Sophomore Year

Fall	Units	Spring	Units
*Beef Production AG54	3	Marketing Agricultural Products AB60	3
Livestock Breeding AG94	2	Forage Crops CP52	3
American Institutions 10	3	*Weeds and Poisonous Plants AG51	3
Agricultural Mechanics AE50	2	Health Education 1	2
Ranch Management AG50A	2	Agronomy CP51	3
Introduction to Agricultural Economics AB50	3	Agricultural Mechanics AE51	2
Elective	3	Physical Education	½
Physical Education	½		
	18½		16½

*Entomology, Poultry, Wildlife Management or Pest Control may be substituted.

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Agricultural Engineering Technician

Freshman Year

Fall	Units	Spring	Units
Applied Psychology 2	2	Irrigation and Drainage SS51	3
Ranch Management AG90A	3	Ranch Management AG90B	3
Farm Machinery AE53	2	Agricultural Sales and Service AB63	3
Farm Tractors AE54	2	Agronomy CP51	3
Agricultural Mathematics AG91	3	Agricultural Mechanization AE63	3
Soil Science SS50	3	United States History 27	3
Conference and Project	1	Physical Education	½
Physical Education	½		
	16½		18½

Agricultural Engineering Technician (Continued)

Sophomore Year

Fall	Units	Spring	Units
Ranch Management AG90C	3	Weeds and Poisonous Plants PS51	3
Introduction to Agribusiness AB51	3	Ranch Management AG90D	3
Agricultural Mechanics AS50	2	Agricultural Mechanics AE51	2
English 50	3	Pest Control AG94	2
American Institutions 10	3	Health Education 1	2
Elective	3	Conference and Project	1
Physical Education	½	Elective	3
		Physical Education	½
	17½		16½

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EDUCATION OF HIGHLY SKILLED AGRICULTURAL TECHNICIANS

by
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Agriculture is, in every sense, a large and important segment of the American economy. Considered as an industry, it clearly reflects the impact of the successful application of scientific research and the wide adoption of modern production methods including standardization of products, and elimination of burdensome human labor by mechanization of many production operations. Thus, agriculture is deeply involved in the pursuit and application of modern technological research and development.

American agricultural scientific development has included five major forces:

A. Federal and State supported agricultural experiment stations and laboratories devoted to research and development of products and methods; often associated with agricultural colleges or universities.

B. Educational institutions for training agricultural scientists and engineers, and also for educating agricultural teachers and related professional personnel.

C. A system of preparatory vocational education for farm youth in the science and practice of agricultural production; and an extension education program for upgrading and updating the technical knowledge and practice of persons already operating farms.

D. A well developed and highly effective organization of Federal, State, and county agricultural agents who, working with vocational agriculture teachers, serve the purpose of transmitting the new scientific developments perfected in the research areas (experiment stations) to the production department (farms) and initiating their adoption. This is largely an educational effort by professionally trained persons.

E. The development, mass production, and distribution of agricultural machinery, equipment, fertilizers, and to some degree in recent years, hybrid or improved strains of crops or livestock. These developments have been supported to a large extent by private industry, often working in cooperation with agricultural research agencies.

All five of these factors involve the use, in varying degrees, of scientists, engineers, and related technical personnel whose knowledge of the application of science to some phase of agriculture contributes to the greater efficiency of the operation of the industry. This is a continuing effort. The explosion of new knowledge in the area of agricultural science and the economic potentials it represents in further increased efficiency in agricultural production increases the need for larger numbers of more highly trained technical personnel, both in the research and development segments of agriculture and in the production area - the farms.

Highly Skilled Technicians

The highly skilled technician is becoming an increasingly essential part of the scientific and management team in modern research, development, production, and services. The team is comprised of professional scientists, engineers, specially trained technicians, supervisors, and skilled production or laboratory workers. The ratio of technicians to scientists or engineers, at present, is usually less than 1 to 1, but the trend seems to be toward 2 or more to each engineer or professional scientist.

Technicians are commonly trained in the physical science and engineering related fields of electronics, mechanical design and production, instrumentation and control, civil and construction technology, chemistry, and metallurgy; and in the life science field of medical laboratory and dental laboratory technology. Technicians will increasingly be trained in such areas as oceanographic, biological, and agricultural and allied life science technologies.

The explosion of scientific knowledge has caused changes in scientific education so the recently graduated professional scientist or engineer often has had little laboratory experience and functions more as a theoretical scientist than in the past. Thus, there is a vacuum developing in the area of applied laboratory knowledge that the scientist or engineer formerly exercised, and which is being increasingly filled by highly trained technicians.

Technical education programs provide a carefully structured, rigorous study of scientific principles and supporting mathematics, plus an intensive laboratory-oriented program of instruction. This type of program is required to provide (1) the knowledge of applied scientific principles and of the hardware, processes, procedures, techniques, materials, and modern measuring and control devices, and (2) the ability to communicate with the engineer or professional scientist doing research, development, production, or scientific service work, and to be his delegate and assistant. Such programs are generally designed for two years of intensive post high school study.

Types of Schools Offering Technical Education

Several types of schools offer technical and related vocational education -- junior colleges, community colleges, technical institutes, and area vocational-technical schools are the institutions in which the greatest growth is taking place. Technical and comprehensive high schools also offer such programs; and their orientation toward the needs of technical and related vocational education is of great importance since they must prepare students to enter technical education programs either late in high school or upon graduation from high school.

Federal Support to Educate Technicians

The need for educating highly skilled technicians was recognized and supported by Federal legislation under Title VIII of the National Defense Education Act of 1958. Its purpose was to train skilled technicians required for national defense. This was not generally interpreted to include agricultural technicians, but the experience during the five years since 1958 has done much to demonstrate the need for technicians in all fields of applied science including agriculture, and to prepare the way for the initiation of agricultural technicians preparatory programs.

This act provided Federal funds, matched dollar for dollar by the States, for the purchase of the expensive laboratory equipment for training highly skilled technicians, for teacher salaries, and for purchasing materials and providing other services for this type of education. Since 1958, enrollment of full-time students in technical education programs -- most of them post high school -- has grown from fewer than 20,000 to more than 75,000 in 1963. In 1958, some 260 schools provided education of this type for highly skilled technicians under Title VIII, and the number has grown to over 700 by 1963. Many of the new schools have been built primarily to train technicians and other skilled personnel.

In recognition of the growing importance of this type of education, Congress, in the Vocational Education Act of 1963, made permanent the provisions of Title VIII of the National Defense Education Act for training highly skilled technicians. The new act also provided substantially increased funds for vocational and technical education for greater numbers of people of all ages. Under this expanded program, increased technician training for agricultural and all life science technologies is made possible and encouraged.

Several major questions and important areas of inquiry present themselves regarding the education of agricultural technicians. Some of these follow.

What Should Agricultural Technicians Be Taught?

What areas of science and related technical knowledge and skills properly comprise the field of agricultural technician education? The most inclusive answer to this question should be "the areas covered by Agricultural Engineering and the physical and life sciences as they relate to agriculture."

Agricultural technicians work in the following general types of activity:

A. Research and development;

B. Production and related processing;

C. Distribution and service; both of machinery and equipment, and supplies such as seed, feed, fertilizer, feeding or breeding stock, pesticides, and others needed for production by farmers and the marketing of farm products.

The problem of identifying the location, environment, and activities performed by the agricultural research and development scientists and technicians is, in principle, not greatly different from that related to any other industry. They work at their research and development locations.

The nature of the necessary elements of education for the technician in the production area of agriculture is less clearly evident than for most large industrial production plants. In very large farming operations, especially those which involve both producing and processing of the product before marketing, the "scientific team" structure can be justified and its elements identified. In smaller operations the manager and operator of the production unit (farm) could well be (and increasingly should be) a highly trained technician. Here he functions with considerable responsibility on his own, but can obtain the professional scientific direction or consultative services he may require from research and development center personnel, or the county agricultural agent, or from the literature of the various scientific and technical societies where services cover the area of his problems.

Agricultural technicians employed in the distributive and service areas excel because they can perform duties actually identifiable as technical in nature, based on their understanding of scientific and related principles associated with the required service.

Skilled agricultural technician is a specialist in some area in the broad spectrum of applied life science or agricultural or closely allied engineering. He has mastered an intensive and rigorous curriculum, a major part of which is science and laboratory oriented in his specialty. This education gives him the knowledge and competencies which enable him to excel in his area of applied agricultural or life science. Such programs usually devote 10% to 15% of the educational program to social sciences emphasizing economics, business management, and human relations.

When considering programs for educating agricultural technicians, the agricultural or closely related occupational competencies must be identified and made the stated objective of the program. The really challenging area for development of agricultural technician education programs is in agriculture. It is obvious that the workers and many of the technical personnel in a cigar or cigarette factory do not need to have an agricultural background. Similarly, the foundry and other workers employed in making castings for farm machinery do not need to know farming -- they need to know how to produce in a metal working and machinery manufacturing organization. It is also obvious that some person knowledgeable of the agricultural facts relating to the quality and nature of tobacco products in the first case, or to the design, function, and performance of the farm machine in the second case, must be operative in the industries cited above. These are the agricultural engineers, scientists, and technicians who will be few in number compared to the mechanical engineers, chemical or metallurgical engineers, and related scientists and technicians in the organization. Agriculture must look primarily to the really agriculture related occupational content in planning new technical programs related to agriculture if they are to contribute solidly to the advancement of agricultural research, production, or related services, and the capacity of those educated in these programs to serve and grow in the application of agricultural science and the occupation of farming.

What Institutions Should Train Agricultural Technicians?

Since technicians are the product of an intensive, carefully structured and rigorous educational program, usually requiring about two years at the post high school level, the most likely agencies for agricultural technicians are those related to or a part of 4-year colleges or universities with agricultural engineering and related science programs, technical institutes, community or junior colleges, and area vocational and technical schools. Two-year preparatory programs for technicians in various agricultural technologies are now, and have been, in operation in each of the four types of institutions mentioned above.

Examples:

I. 4-year university - University of Maine, Orono, Maine

   A. Two-year agricultural technology program has been in operation over 20 years, and the relative yearly enrollment has kept pace with the State's population.

   B. The State University of Pennsylvania offers 2-year technician programs in agriculture and in forestry.

II. Agricultural and Technical Institutes

   A. At Farmingdale, New York

   B. At Delhi, New York

   C. At Alfred, New York

   D. At Canton, New York

   E. At Cobleskill, New York

   F. At Morrisville, New York

   G. Thompson School of Agriculture, Durham, New Hampshire

   H. Vermont Agriculture and Technical Institute, Randolph Center, Vermont

   I. Delaware Valley College of Agriculture & Science, Doylestown, Pennsylvania

III. Junior Colleges

   A. Reedley College, Reedley, California

   B. Fullerton Junior College, Modesto, California

   C. Ventura College, Ventura, California

   D. Stockton College, Stockton, California

   E. Bakersfield Junior College, Bakersfield, California

   F. Orange Coast College, Costa Mesa, California

   G. Hines Junior College, Raymond, Mississippi

   H. Tyler Junior College, Tyler, Texas

IV. Area Vocational and Technical Schools

   Programs are being developed in the education centers in North Carolina.

These are only a few of the many possible examples. A complete directory of such programs is needed. Many exist. They teach a variety of programs. These should be completely cataloged.

What Instructional Materials Are Available for Teaching Agricultural Technologies?

Since the knowledge required by technicians is closely related to that taught to professional engineers and scientists, it is clear that the subject matter to be taught is already in existence. The selection and arrangement of the courses in an agricultural technology curriculum must be made in light of the occupational objectives for which it prepares the student. Instructional materials for a given course may be in a textbook, but usually must be drawn from several sources. Some of the sources of available information are:

A. Books.

The textbooks and references used in educating agricultural engineers, physical scientists, and life science students for the bachelor's degree contain the fundamental materials for educating technicians. Much of this material must be modified to a more highly laboratory oriented or more "applied science" emphasis for technician education courses.

B. U. S. Department of Agriculture Publications.

Research reports.
Agricultural Extension Education Service materials.

C. Colleges and universities teaching agriculture and related subjects, doing agricultural research and development, and providing agricultural extension education programs.

The libraries, publications and services of the staffs of these institutions contain a wealth of material from which may be drawn pertinent content for technician training.

D. Publications and services of scientific and technical societies.

The technicians must have the use of and appreciate the vital importance of the publications, meetings, and other services of scientific and technical societies. Each branch of applied science which is of significance has a well developed scientific or technical society comprised of the leaders in the field, and whose publications represent the most complete and most up-to-date information in the field. The information covers all important aspects from new information developed by research to the latest and most complete applications of the knowledge in the field.

Nearly 50 such national organizations can be identified for agricultural and related technological fields; 10 more devoted to forestry and forest products; and 4 to fisheries and oceanography (see attached lists). Almost all have regular publications. The titles of these national societies give some idea of their diversity and the comprehensive coverage they provide for the field of agricultural and related technology.

E. The experience of those institutions already providing programs doubtless can provide a wealth of pertinent and useful materials, proven by experience.

Other sources of materials are available. More comprehensive listing of these sources should be made of those specially useful for educating agricultural technicians.

Who Should Be Trained as Agricultural Technicians?

High school graduates, particularly those with farming or vocational agriculture school background, comprise the major population from which potential agricultural technicians may be drawn. The interests, educational preparation, and other important characteristics of this segment of our youth need to be studied for purposes of identifying good potential agricultural technicians and guiding them into such programs.

The following factors might well be considered in such studies:

A. Large numbers of capable graduates of rural and suburban schools have the scholastic ability to succeed in the intensive, post secondary curriculums required to educate agricultural technicians but do not go into such programs. Is this because programs in agricultural technician education are not sufficiently available?

B. Many of these high school graduates want to work in agriculture-related occupations but can't finance a start in farming or aren't employable because of lack of sufficient education to bring useful services to an employer.

C. With the increasing tendency for employers to favor the older and more mature employee, the two-year period after high school might best be used to provide a useful and substantial education to youth interested in agricultural occupations, thus serving the dual purpose of equipping them with salable educational qualifications as well as acceptable maturity for employment.

What Special Agricultural Technologies Should Be Taught?

Past experience will provide some guidance on this question. In all cases the main scientific and related content should be preparatory to work in an agricultural occupational field in which there are employment opportunities, usually a cluster of activities centering around a major field of interest. The major divisions of subject specialization in agricultural engineering or professional agricultural science education should be suggestive of the technological specialities in the field. Some major areas seem to be:

A. Agricultural Engineering and Production

B. Agronomy, and Soil Reclamation and Conservation

C. Animal Husbandry, Science and Pathology

D. Agricultural Biochemistry

E. Agricultural Botany and Plant Pathology

F. Agricultural Entomology and Zoology

G. Dairy Science

H. Poultry Science

I. Forest Culture and Management; Wildlife and Conservation

J. Fisheries and Oceanography

In the development of a curriculum for any of the foregoing major areas, the underlying sciences and related technical study of procedures, processes, techniques, methods, and principles should be the major emphasis. They should be taught with extensive laboratory experience and should be application oriented.

Each such curriculum should provide courses in mathematics to the degree necessary to support the science - in communications and technical reporting - and should include courses which provide pertinent understanding of the applicable principles of economics, business management, and human organizations and relationships.

What Success Have Agricultural Technicians Experienced?

A follow-up study of the agricultural technicians graduated from the University of Maine, the technical institutes in New York, and selected other places should be made. Such studies may already be in existence. Certainly, these programs would not have continued for some 20 years if there had not been evidence of their effectiveness.

Such a study would have meaning in light of the increasingly technical nature of many agricultural operations and processes.

How Many and What Kind of Agricultural Technicians Are Needed?

A comprehensive study of the number of agricultural scientists, engineers, and technicians employed in agricultural school research and development, agricultural experiment stations including desalinization projects, forestry and related research, fisheries and oceanographic research, private industrial agricultural research laboratories, and by all other identifiable employers should be made. This information may already be available but should be consolidated and examined in light of the probable need for technician education programs. If the ratio of technicians to scientists and engineers is found to be less than 1 to 1, there may well be important implications pointing toward greatly increasing the number of agricultural technicians to support the entire agricultural industry.

Why Is a Study of Agricultural Technician Education Important?

The answers to the foregoing and allied questions constitute a major challenge to vocational and technical educators in the field of agriculture and those closely related to it. The programs which should be initiated to meet indicated needs should provide new opportunities and horizons for many of our most able and promising youth who need to develop salable competencies and who want to work in agricultural occupations.

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SCIENTIFIC AND TECHNICAL SOCIETIES PERTINENT TO AGRICULTURAL AND RELATED TECHNOLOGIES

Agricultural Technology

American Society of Agricultural Engineers
Agricultural Research Institute
American Association of Botanical Gardens and Arboretums
American Bryological Society
American Dairy Science Association
American Farm Research Association
American Fern Society, Inc.
American Horticultural Society, Inc.
American Institute of Biological Sciences
American Institute of Park Executives, Inc.
American Phytopathological Society
American Pomological Society
American Society for Horticultural Science
American Society of Agronomy
American Society of Animal Production
American Society of Landscape Architects
American Society of Naturalists
American Society of Parasitologists
American Society of Plant Physiologists
American Society of Plant Taxonomists
American Society of Range Management
Animal Care Panel, Inc.
Animal Nutrition Research Council

Association of American Feed Control Officials, Inc.
Association of American Fertilizer Control Officials
Association of American Pesticide Control Officials, Inc.
Association of Official Agricultural Chemists of North America, Inc.
Association of Official Seed Analysts
Bio-Dynamic Farming and Gardening Association, Inc.
Biometric Society
Botanical Society of America, Inc.
Council for Agricultural and Chemurgic Research
Crop Science Society of America
Ecological Society of America
Entomological Society of America
Grassland Research Foundation, Inc.
Herb Society of America
National Association of Gardeners, Inc.
National Shade Tree Conference
Nature Conservancy
Plant Propagators Society
Potato Association of America
Poultry Science Association
Society of American Bacteriologists
Soil Conservation Society of America, Inc.
Soil Science Society of America
United States Livestock Sanitary Association
United States National Committee, International Commission on Irrigation and Drainage
Weed Society of America

Forestry and Forest Products

American Forestry Association
American Fisheries Society
American Institute of Park Executives, Inc.
American Society of Range Management
Association of Consulting Foresters
Forest Products Research Society
Grassland Research Foundation, Inc.
National Shade Tree Conference
National Wildlife Federation
Natural Resources Council of America
Nature Conservancy
Northeastern Loggers Association, Inc.
Society of American Foresters
Society of Wood Science and Technology
Soil Conservation Society of America, Inc.
Soil Science Society of America
Technical Association of the Pulp and Paper Industry
Wildlife Management Institute

Fisheries and Oceanography

American Fisheries Society
American Institute of Fishery Research Biologists
American Society of Limnology and Oceanography
National Shellfisheries Association

STUDENT SERVICES FOR AGRICULTURAL TECHNICIAN PROGRAMS

by

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My assignment for this presentation is entitled "Student Services" which I find may include a multitude of things depending upon one's interpretation of the term. One layman to whom I mentioned this presentation said, "Oh, you're going to speak on curriculum, aren't you?" I am sure this wasn't exactly what Dr. Taylor had in mind but it does point out that we must be careful with our terminology as we proceed in this new era in vocational education. Certainly it is not unreasonable to assume that the curriculum is a student service even though we may not consider it in that context.

For purposes of this discussion, I plan to deal with the four major areas indicated on the program and a few minor items that also relate to this broad topic of student services. As background information, I would like to outline our agricultural technician program in New Hampshire for you.

Prior to 1900, a two-year program was established as part of the College of Agriculture at the University. This, in a sense, was the beginning of technician training for those who could not or would not enroll in a four-year college program. In 1939, the two-year course became a bona fide vocational agriculture program called the Applied Farming Course. It was designed to serve a group of young men who did not complete their secondary school program as well as those seeking advanced education after high school graduation. Through the years, a trend toward more theory developed and in 1953, the program was reorganized and renamed the Thompson School of Agriculture. Since 1953, more and more emphasis has been placed on the technician phases of agricultural work. Thus this program has served the rural youth of New Hampshire for over 60 years and has adjusted to meet changing times. The school has its own staff of instructors in agricultural subjects, a director and will shortly have a staff covering the academic subjects including communications, science and mathematics. The overall administration is handled by the Dean's Office of the College of Agriculture but the instructional staff is selected according to the school's own standards. Thus, it has, with one technology exception, fully qualified teachers of agriculture on the staff. This we feel has been and continues to be important for these men have the Vocational Agriculture philosophy many professors do not seem to understand or appreciate. I might also say that the two forestry technology instructors who were basically trained as foresters are taking those courses necessary to qualify as agriculture teachers.

This may seem rather remote from the topic at hand but we feel strongly that the philosophy of the staff relates closely to student services. Now to get down to specifics.

First, student selection. What is it we are looking for in a young man or woman, and we must recognize there will be more and more women in our programs who will become our agricultural technicians of tomorrow. The admissions officer will say, "Seek students with top grades and a strong academic training." The farmer says, "He must be physically strong even though we are becoming mechanized." The employer will say, "A mature and dedicated individual," and the class instructor says, "He must be interested in my course and willing to study." Pulling these things all together then, the potential student should be intelligent, physically fit, mature, dedicated, interested, and a willing worker. It is probably safe to say that if any of our teacher educators should hear of this individual just described, he would be swamped with application forms to enter the teacher preparation program. I am sure all of us as supervisors would wish them well. Actually then, it becomes a matter of the ability of the individual as to the actual program that should be undertaken.

How intelligent must he be? We say that he should be a high school graduate, although we do not require it. The high school program should include in addition to the English and social studies, mathematics including algebra I, biology and chemistry. Vocational agriculture is also recommended. In New Hampshire, we have found that the lack of vocational agriculture is not as critical as the lack of science and math in the more technical programs. It is our firm conviction, however, that the applicant can and should have both vocational agriculture and the academics. It is also quite evident that we do not need the highest achievers in the high school program as required in many four year programs for the interest and motivation factor are often enough to carry the less than the best student through to a successful completion of his program. Thus, we may and do accept students who cannot secure entrance into the four-year college but have the ability to achieve in the technician program.

Physically of course, the applicant should be able to meet the demands of the job for which he is to be trained. As we have seen this week, the types of work we may be training for are many and varied and no definite overall criteria can be established. Let's not be fooled, however, by the rapid trend in mechanization. Many of our technician jobs will be very physically demanding and we owe it to our potential students to make them aware of this fact.

An example of this was brought vividly to our attention this past year. In our forest technician program, much outdoor work is required during the school year. It is amazing what a 3-hour laboratory session in 2 feet of new snow, temperature 5-10° with a fairly strong wind will do to separate the physically fit from those less able or perhaps those less interested.

This brings me to the two criteria of interest and maturity. They are probably as important as any item mentioned. For this reason, it is requested that every applicant and his parents visit the school to have a personal interview with a member of the staff. Here it is possible to explain the program and get the applicant's first hand reaction to the demands that will be made of him as a student.

Why does he want to enroll? Is it parental pressure, personal interest, a true understanding of the vocational opportunity or a misconception of its objective? A lot of applicants show apparent interest in the forest technology program when actually they have their eye on a ranger uniform, a conservation officer's badge, hunting, fishing, but have no concept of the actual work done by forest technicians. If they are not stopped in the selection process, then we as educators have done them a disservice, not a service.

Is he willing to be away from home on a placement program for two summers doing work that is related to the instructional program? This question often times brings out the maturity of the parents as well as the applicant. Are they ready to cut the apron strings?

All of these things and many more relating to his definiteness of purpose, independence, judgment, citizenship characteristics, and maturity can be partially evaluated by the personal interview. Employers often spend large sums of money to arrange for personal contact with prospective employees. Shouldn't we expect prospective students to spend some money, visit the school of their choice, and shouldn't we as educators provide the staff to make the visit possible? We are dealing in higher stakes than the employer for this may be the decision that will make or break the individual for life. There is nothing more disheartening than observing a well qualified young man or woman flunk out of a program for which they were unsuited and withdraw completely from any future formal educational program because of this original failure which in many instances could have been avoided. Perhaps I have dwelt too long on selection but if we do not carry on this service properly, our whole program will likely be unsuccessful. As we secure additional funds, build larger schools, have demands for more teachers than we can provide, then selection is a service we may feel can be delegated to others who actually may not be properly qualified to do the job. Let's not fall into the trap of letting student selection suffer while we devote our efforts to the broadening of curriculum, expansion of facilities or other activities which may at the time seem so vitally important.

Counseling is the second major area for consideration as a student service. As you can see, I have indicated a certain amount of counseling is involved in student selection. Once a student is enrolled it is imperative that he continue to have sufficient contact with the staff to keep him properly oriented. In New Hampshire, we have established a system of faculty advisors for our students. Each student is assigned an advisor within his major area of interest. It is the student's privilege and responsibility to confer frequently with the advisor about his work and to seek help and guidance as it is needed. The advisor is, of course, one of the student's instructors and will have first hand knowledge of the progress being made in his respective classes. Through this constant contact, a high degree of rapport can be developed between the two.

Some concern has been expressed that instructors cannot adequately advise students because they are not trained in the area of guidance and counseling. This may be a valid criticism in other areas but for years, vocational agriculture has prided itself on the relationship between student and teacher. This same relationship can be developed at the technician level if the instructional staff has the correct philosophy as previously pointed out in this presentation. In those areas where it becomes necessary to deviate from the vocationally trained and oriented staff then caution should be used in making these types of assignments. In no way should this be interpreted to mean that every vocationally trained teacher is a good counselor but the chances for success are considerably greater. This instructor/student relationship permits early diagnosis of any major problems that begin to develop. The Thompson School is located on the University campus and we are fortunate in having the University counseling service available if a major problem should develop. Over the years, a very small number of referrals have had to be made to this service. It is very important that if regular counseling is not done by the staff on an advisor basis then vocationally oriented counselors should be available for the students to confer with. Student counselor ratio is a point of little agreement. Recommendations can be found as low as 1-50 and up to 1-200 depending on needs. The quality of your student body can affect this number quite radically. A student body composed mostly of rural youth in an agricultural program seems to demand less counseling than their urban or city counterparts in the same program.

Again, let me reiterate, we believe that good selection can cut counseling needs and costs substantially.

The third service of placement must be divided into two major areas. First, placement for work experience during the formal education period and second, placement for full time work as a graduate of the program.

We require that our students complete two 4-6 month work experience programs during the two years they are enrolled in the program. School closes the first week in May and reopens in September. In addition, one and two week practicums are required during the regular sessions.

To be of the utmost value summer placement must be carried on under the best educational circumstances possible. In a few instances where outstanding home farms are in operation, the student is allowed to do his placement on the family farm. It is felt, however, that whenever possible, outside placement away from the home, will provide the widest range of experiences giving the student the most value from his placement program.

Before students are allowed to accept employment for placement, a thorough check should be made to see if the job fulfills the necessary qualifications. Is the employer willing to assist in the education of the student by rotating jobs and responsibilities? Does the local county agricultural agent and/or agriculture teacher in the area feel this is a good agricultural operation? Is the operation modern, efficient, and run in a manner that will provide good training? Are the working conditions those that the student will find when he seeks full time employment after graduation? These and many other criteria pertaining to the type of training being given must be met before the student is allowed to accept the position. The student staff advisor should provide him with sufficient information concerning wages, working hours, potential fringe benefits, insurance practices, and other pertinent information before the student makes his final contact with the employer. It is the student's responsibility, however, to settle problems of wages, working hours, housing and all other questions with the employer for this will be his responsibility following graduation. An agreement should be developed, written and signed by the employer, student and the staff advisor outlining the arrangements that have been decided upon. If placement is with the soil conservation service, forestry service, or large commercial company and a standard employee training course is available, it should be used. A written contract is still essential to eliminate any misunderstandings.

Every student should be required to send a weekly report to the school during the placement period indicating work done and any other important information the student or school feels should be brought to the advisor's attention. Failure to submit these reports weekly can mean suspension from the program as this is an integral part of the course work. The serious weakness in this whole placement program is that the employer must pay the student and thus he must look at the dollar value returned rather than the education being given. Ideally this should be part of the regular course work, graded by the employer and done for credit not salary. In New Hampshire, we have considered the possibility of setting up a pilot program with a few students being placed on a subsidized program. The student would not be paid for his placement program between the first and second year. A scholarship fund would be used to pay the student's college expenses the second year of the program. The employer would act as an instructor following a well developed course outline. It is felt this would provide the student with a better education and more practical experience than the present program. The student would be graded for his placement and receive credit toward graduation. We feel this would allow us to maintain higher educational standards and perhaps result in better trained graduates. Most of our people average $60 per week plus room, board and in many instances overtime pay in excess of 50 hours per week. A subsidization would be very expensive but we hope that such a pilot program may be started in the near future.

Placement for full time work after graduation is literally the least of a school's concern if the program is fulfilling needs of the industry. In New Hampshire, we cannot begin to satisfy the demand for trained technicians in production agriculture or related occupations. We do have an informal placement program in the school and in addition use the regular university placement service as a contact agency. In schools where this type of service is not already available a registration and placement service should be established to give both the graduates and employers a chance to contact each other. One of our problems has been that employers become impatient and will sometimes employ a student after one year of instruction. The majority of employers recognize the bad features of this practice and respect the two-year training period. A sound placement program can help control this problem.

As a follow-up procedure, a record should be made of each graduate's employment and regular contact made to see how he is progressing. An alumni association can be established and by holding at least one meeting each year a large number of alumni can be contacted. In a small state it is relatively easy to keep personal contact with the graduates as members of the staff visit students in their placement programs. Often times, students are placed in businesses operated by former students and close contact is possible through present enrollees. In many instances as graduates feel a need to change employment they will return to the school for suggestions of possible new positions available. Through the follow-up procedure, formal or informal, it is possible to review the successes or failures of the program and make course adjustments accordingly.

These then, selection, counseling, placement and follow-up are the four major services which should be provided by schools offering technician programs. I would like to mention four additional services which should be provided for students. First, let's be honest with the student and provide instruction in those areas or vocations that have real potential. We must analyze the need before starting a new course. In New Hampshire, we carefully studied the demand for forestry technicians in our own and neighboring states and found a real demand for technicians by the industry and the forest services. Industry alone showed a tremendous need yet almost none of our students are being placed in industry. When the technician was available the job was not! Fortunately, we had sufficient need in other areas to take up the slack and we cannot yet fully supply the annual demand. If, however, we had gone strictly on the needs expressed in the industry we would have been doing a great disservice to our future students by starting the course.

Second, let's take the halo off the word technician and be sure our students realize that this may be working with our hands, not just white collar supervision. Too many graduates from our program are becoming "degree conscious" and feel that manual labor was just a part of the program for education purposes but as graduates they are above this type of activity. Sometimes we as educators create this situation as the great advantages of education are expounded upon. Let's serve our students by letting them know where they are going and what they will be doing after graduation.

Third, let's provide a service to our prospective students by informing high school guidance counselors about our programs. Whenever possible, have a member of the staff visit high schools and become personally acquainted with the guidance counselors. Make at least two mailings to the counselors each year with up-to-date information on courses and vocational opportunities.

Guidance counselor invitational drive-in conferences are excellent means of contacting counselors. Yet, few schools or colleges use this approach. The counselors appreciate the chance to visit the school first hand, be treated as an honored guest, discuss mutual problems and develop new and better understandings. Don't overlook this opportunity.

Fourth, let's not overlook a youth organization for our students. An FFA type program to develop leadership and pull the student body together is most important. We feel this has been a weakness in our New Hampshire program because the students have never fully supported such a program. They are eligible for all university organizations except varsity sports and have, therefore, substituted these activities for a specific youth organization. The staff feels that there is merit in a separate organization and perhaps we should give it some consideration at the national level as revisions to the FFA organization are contemplated.

As indicated in the beginning, these are areas that also merit your consideration. You may want to pursue them further at another time.

To summarize briefly. Select an intelligent, physically fit, mature, motivated student with a respectable educational background. He will not necessarily be at the top of his class, but he may still be a good candidate for the technician program. Give him the proper counseling and guidance that will keep him on the road that best fits his interests and abilities. Above all else, provide him with a placement opportunity as part of his educational program that is meaningful and truly provides learning by doing, under the conditions that he will find exist upon entrance into full-time employment. Follow-up the graduate to rate your success and determine your needs. In addition, provide those other services which will encourage potential students to seek your program as a part of their education.

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FACILITIES AND EQUIPMENT FOR AGRICULTURAL TECHNICIAN PROGRAMS

by
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The acquisition of facilities and equipment for preparing agricultural technicians is a difficult task. More difficult perhaps is how to throw some light on this subject in one hour.

First off, in my opinion, there is no substitute for a truly effective teacher. Note that I said "effective" teacher, not just a well prepared teacher. We need more people who understand technical agricultural education and, therefore, we should ever be alert to encourage the right young men in this direction. There was much confusion as to just what an agricultural technician is but I think we, now, have a reasonably well-focused idea of this. Brick and mortar, animals, crops, livestock and machines are great aids but they do not substitute for a good teacher. I have heard some people complain that they did not have proper equipment to teach and then, after getting the equipment, they still could not teach.

Agricultural technician education is not readily supplied by chalk board, textbook and visual aids alone, important as these things are. Surely every good program should have these available but sometimes it is difficult to make people understand that the training of technicians requires a great deal in the way of equipment and facilities and, therefore, is more expensive than other types of education. In the past we have had farm-reared young men available and qualified to fill many of these technician positions. This pool is drying up so we better get busy.

So you will more clearly understand some things to follow, I would like to establish a point of view, whether you agree with me or not. First off, to me, all education is vocational and it is never ending. Once past the elementary grades, the function of education, so it seems to me, is to prepare for earning a living. If a living cannot be earned, all the schooling in the world is useless. Liberal arts education is fine but, in my opinion, it should come with or after learning how to earn a living. (Before this presentation is over, you may see how much I need some liberal arts education.) Thus the agricultural technician has something to sell after graduation and is prepared for the entry job and hard work.

We think of an agricultural technician as a specialist yet he should first be a generalist, in my opinion, to be prepared for specialization. Many employers of agricultural technicians do not have an agricultural background yet they are the first to recognize its need.

A short while ago, the American Metals Climax Company of New York City phoned and wanted a person to do research on potash. Potash being a by-product of their operations, they wanted a person to dig out where and how potash is used, in what quantities, etc.; then after that to go out on the road selling. When I inquired what territory, I was told the United States. By that time, feeling a bit sure of the situation, I said, "Why don't you get an arts college graduate?" The answer was most emphatic that they must have an agricultural person and, sorry to say, I could not locate anyone who would take this opportunity in New York City at $90 per week.

Paramount to providing this unique type of agricultural technician education is a good farm. In our area, most people desiring an agricultural education have had little or no agricultural experience. This agricultural experience we must provide, and usually in two short years. At least we can get them started in this length of time. If you question the feasibility of giving agricultural education to urban students, we can discuss that later.

A farm for educational purposes ought to provide first hand experience in the phases of agriculture common to the area and some experience in additional enterprises. There is a limit to this, however - usually the source of funds.

Where dairy farming predominates, a herd should be of such proportions that students get some real experience learning to care for all ages. Fortunately, a small herd quickly grows in number. At Farmingdale, we have a hard time keeping the herd under 90. Everyone likes calves so the pressure is on to raise nearly every one. This provides good learning situations. Perhaps it would not be necessary in all parts of the country but, in the northeast, I think every agricultural technician should be able to milk by hand and machine even if he does not get practice enough to become efficient. Forty milking cows gives us about the right number for 100 first year students to get a certain minimum of experience, to provide sufficient milk for processing by food technology students, and to supply our dining hall.

A laying flock of some 2,000 birds, some on the floor and some in cages, plus hatching and rearing 3,000 to 4,000, will provide poultry experience. This can be enhanced with turkeys and other poultry if desired.

Twenty to 30 ewes, 20 beef brood cows, and 10 brood sows with their increase will provide further livestock experience. In some places, a horse enterprise, goats, rabbits or game may be feasible. As you can see, I am speaking as a northeasterner but the principles involved are the same and adjustments can be made.

Buildings for these livestock enterprises vary widely. Some feel that an educational institution should be a show place. Certain taxpayers in our state do not. There can be a happy medium. I am not in favor of building for the ages. If we have a choice in the matter, let us put these buildings up in such a fashion that we can afford new ones or at least remodel ones in 20 years. My grandfather did me no favor by building a great big barn out of heavy timbers, full of knee braces and almost completely unadaptable to present day agriculture. We don't know what changes are coming but we certainly know that they are coming.

Crop land to go with these enterprises can vary but there should be enough land to at least illustrate how the crops are produced and to provide study opportunities for soils and crops courses. The acreage devoted to cash crops can vary but some cash crops typical of the area should be produced.

Perhaps this is a good place to observe that probably some of you are saying that this is vocational agriculture and what is technical about it. To a city-reared youth, it is all very strange and can be made just as technical as faculties wish to make it. Call this productive agriculture if you wish. We know that only a small percentage of our graduates engage in actual crop and livestock production. However, it is my firm conviction that every would-be agricultural technician should have some of this experience in his early years in order to be properly qualified in his specialization. After all, how many at 19 or 20 years of age really know what they are going to do? How many of your knew; how many know now? What part of your agricultural education do you consider a waste of time?

How much farm machinery should be provided? This can run into real money, as you know. However, it is not necessary to have all the latest machinery and it is not necessary for every student to become proficient with every machine. Some machines can be owned, some can be rented or leased, and some can be had on a demonstration basis. Machines can be selected for their educational value, rather than as a farmer would, on the basis of need for his particular acreage. Keep in mind that young people and their education is our product.

One tractor each of as many makes as possible is desirable, possibly changing over the years, particularly as to size. Makes should be those popular in the area. Again, some tractors can be owned, some leased and some use can be made of dealer show rooms, demonstrations, field days, farm auctions, etc.

It may be well to own as many of the soil engaging tools as possible rather than getting them in some other way since wear and breakage is apt to be greater than with other machines. Some of these may be easier to come by than you might expect. I know of a case where a barn burned and the owner said we could have what was left of a John Deere plow. We overhauled and painted it, getting good lab instruction, and owned another plow. In another case, a moldboard, coulter assembly and two new plow shares arrived in quite a heap. Strangely, some of these repairs were fastened to other parts and all went together to make a plow. A tractor was badly burned in an institution fire. Fortunately, bearings were not melted and so, after some time, effort, great quantities of repairs and much instruction, we had a good model S Case tractor. I'll admit that an instructor must be alert to every kind of opportunity and, more than that, willing to work hard and long. If he does this, he may find this desire and willingness to work rubbing off on his students and they, in turn, will be better prepared to take a job after graduation.

Certain equipment can be leased. Tractors and harvesting equipment are good examples. Some manufacturers have an educational policy of leasing machines at 10% of the purchase price per year. Usually the machine is replaced each year, or every two years. Of course, this is a way to own a machine in ten years but who wants to own an old tractor? Sometimes a piece of equipment can be leased at a fixed price for three years and then owned - a bulk milk tank, for example.

This past spring, for $90, we had a large, current model, shade tree sprayer on campus for a month. It was delivered by the dealer, thoroughly demonstrated and explained, and then students were permitted to use it. Laboratory study use was made of it on rainy days. Cost per student was under $1.00 and we got campus trees sprayed in the bargain. A few cars, too! Possibly one of our graduates being a salesman for the dealer had something to do with the deal - an excellent job, by the way, for an agricultural technician.

A further word at this time on obtaining these facilities. Surely there is no substitute for a generous legislature or some other body with adequate funds. However, farm land and buildings might become available in surprising ways. Eventual ownership is to be desired so changes can be made as needed.

Buildings can be added to or remodeled to some extent through class instruction, and small buildings can be constructed. Portable hog houses and poultry shelters are good class projects when wisely developed. Concrete work can be done. Possibly a campus organization like the Cattle Club can take on a project. Faculty and students can furnish labor on quite a sizable project if properly planned. A well might be driven or water piped; all sorts of things can be done if sparked correctly.

Farm machinery can be purchased through competitive bidding and often comes knocked down, thus providing an opportunity for good teaching. Arrival of these machines can be scheduled to coincide with the instruction program.

Much more could be said on acquiring equipment but do not overlook the possibility of income through the production, grading, packaging and sale of agricultural products after they have served their instructional function. The operation of a market can be profitable as well as educational.

What other facilities are needed? What equipment is a must and what is desirable? As an example, let us take a subject like soil science. The already mentioned farm is highly desirable so students can go to the fields and actually use the crops and study how the soil has been handled and will be handled in the future. Class information can be applied in the field even to soil preparation, compaction, liming, fertilization, irrigation, etc. Checks can be run, which often is hard to do on another's land. Familiarity with the machines used and how to regulate and check the rate of application is vital and technical.

For indoor laboratory work in soil science at Farmingdale, we have the following items, with their approximate cost.

3 pH meters	$1,050	2 solu bridges	$ 170
2 ovens	600	2 centrifuges	200
8 torsion balances	1,500	1 refrigerator	300
8 Harvard balances	160	1 muffle furnace	300
1 triple beam scale	175	1 colorimeter	300
1 scale	80	8 sets Kjeldahl apparatus	400
1 aero relief map	65	1 Wiley mill	300
		Total	$5,600

This, of course, is in addition to the usual run of soil testing equipment, glassware, set-ups, gas, water, electricity, etc. This equipment in the hands of an outstanding teacher will educate some good soil technicians. Probably no one student will use all this equipment on his job but he will use some of it. Should it happen that he uses none of it, he will know something about what can be done and he will have accumulated some knowledge and know-how that he can later apply. We cannot supply the student with experience for everything to come later in life but it is a function of our educational system, it seems to me, to provide groups of students with a chance to use equipment such as the above. Also available is a movie projector, slide and film strip projectors and, on occasion, an overhead projector.

Time does not permit going through this same procedure for chemistry, microbiology, zoology, botany, meat amd meat products, arboriculture, entomology, physiology, genetics, food processing and other courses.

Perhaps here is a good time to point out that the inclusion of more science courses like these represents one of the big differences between so called vocational and technical education. True, some of this is included in vocational education but not to the same depth and, of course, many of these do not go to the same depth as at a four-year college or university.

More mathematics, as such, is included in most agricultural technician programs and some say there should be more. High schools are doing a better job with math and so students will be prepared to handle more. Included in this is the problem of balance; that is, how much general education to how much technical. At Farmingdale, the curriculum is approximately 1/3 technical agriculture; 1/3 general education like English, math, science, sociology, psychology, etc.; and 1/3 related to both. Some alumni several years after graduation wish they had more English. I have not taken time on facilities for English, math, etc., assuming that these are well understood by all, being much simpler and cheaper to provide than the equipment and facilities for technical education.

How about sharing equipment with other areas? This is a good theory but in agriculture there are not too many machines to share. We have exchanged the use of a concrete mixer, power plant and a few other things but not many. We tried it with a hydraulic press, only to find that when we wanted it back, the press had been painted and bolted to the floor.

Some facilities can be developed. In agriculture and horticulture, we deal with growing things so increase can be made. Livestock, fruit crops, trees, shrubs, plants, gardens, turf areas, etc., can be easily increased to meet instruction needs, if land is available.

Let me tell you how to get some additional dairy cattle. At the cow barn one day, I asked a small group of seniors if our dairy cattle instruction would be improved with some other breeds besides Holsteins. They said, "Yes." A little later, one of them asked me if we would accept some Ayrshire calves if given to us. I said, "Sure," thinking he was joking. At 10 P.M. a few Sunday nights later, this same student appeared at the cow barn with a U-Haul behind his car and 8 calves gathered from various breeders around New York State. One of our graduates, an Ayrshire breeder, heard of this and sent us 2 more calves. Now we have some fine Ayrshires coming into milk. One has made 6,230 pounds of milk and 276 pounds of fat in 181 days and another 5,116 pounds of milk and 212 pounds of fat in 149 days. Right now I'm looking for a place to trade some Aberdeen Angus or Holsteins for some Brown Swiss and Jerseys.

I urge the development of a market. Many positions for agricultural technicians are in the area of distribution and marketing and surely all of agriculture needs technicians here. A market can provide real zest to instruction in harvesting, grading, packaging and selling. One student learned a great deal from a rubber band he lost showing up in a professor's TV dinner. Food technology students at Farmingdale rotate at 4 to 5 P.M. two days per week selling class prepared food items to campus personnel. If you can retain control of these receipts it helps in many ways.

How can facilities be kept current and up to date? Another way of putting it is, how can we keep up to date? Agriculture is changing so rapidly I find it most difficult. Where a rental system is followed, farm machinery will be of the current model. Companies like to have their new machines seen and used by students. Loaned machines usually are not allowed to get old. A branch manager was on our campus and saw two red tractor engines being torn down and put back together by students. Whereupon he asked if we would like one of his. Naturally I said yes and we got an Oliver on the same basis, diesel no less, the next week.

Develop good contacts with all dealers and equipment will come easier and be easier to keep up to date. Dealers and manufacturers cannot help if they do not know the need. This will aid in job placement, too. Faculty members should attend demonstrations, field days, farm auctions and other affairs locally and on the state level in an attempt to keep up to date. At least one new thing can be learned at each such affair. Keeping in close touch with experiment stations, the state college, research farms, etc., will help. Salesmen can take up a lot of time but they also can bring you much new information regarding equipment.

Good records should be kept and proper depreciation taken annually so new models can be obtained. Quite often this can be done in such a way that some new equipment arrives every year and some old machines are retired. Getting such records started can be quite a job but, once under way, this is a big help in justifying the need for a new piece of equipment. If it is a new program, keep records from the start. Naturally there has to be some budget to work with and agreement on how long a piece of equipment must last. I question very much the feasibility of instructing with equipment that is too old. This means very careful justification when making requests. Saying an item is "badly needed" doesn't cut much mustard with most administrators. Managing in some way to have a fairly generous budget for repairs will help greatly in keeping equipment up to date.

A picture is no substitute for the real thing but is a satisfactory substitute when the real thing is not available. Therefore, the development of a movie, film strip and slide library is a most valuable facility. I like slides best of all for then I can provide my own sound. Rerunning a movie without the commentary and providing your own sound sometimes is a good technique. With some planning, effort and a little money, much can be done in a year or two. Be careful, though, not ot use these things as a crutch and use them too long. Throw them away when they become obsolete, or save them for historical reasons.

Dr. Taylor very generously asked me to dream a little and this I am going to do as I conclude.

Will we stick with the term "agricultural technician" too long? True, it is a new term yet but watch out that we don't use it too long instead of inventing a new one. Perhaps it is not even accurate now! Is the manager of a feed store a technician? The sales manager for frozen foods? Supervisor of a duck processing plant? Merchandising representative for United Fruit? Buyer for a garden center chain? Inspector for the State Department of Agriculture? Nursery salesman? Owner of a landscape service? Assistant purchasing agent? Produce broker? And now hang onto your seat - a cosmetic sanitarian? One of our food technology graduates is in quality control work for Revlon, because so many dairy products are used in cosmetics. I'm satisfied he's a technician but not so sure it is agricultural. The Avon people are after our graduates now.

Some people are worried about the population increase. I'm concerned, of course, but not worried. Food may well be a problem but we don't know what we can produce if we really have to. If we can just operate under a free private enterprise system, the farmers of this country will produce if there is profit in so doing. A few months ago, some people were squawking because lettuce was 30¢ per head. Last week I couldn't get potatoes at my house because they cost 10¢ per pound. We've been blessed with abundance and cheap food for a long time. This may not always be so. We better get ready! We better gird ourselves to produce a lot more agricultural technicians and we had better produce better ones. In my opinion, we are just emerging on the greatest era of agricultural education we have seen since the Smith-Hughes days. I don't mean just this 88-210 money but the long range haul. One hundred years ago when 85% of our people were on farms, to now with the reverse, we are running out of people that absorbed great agricultural know-how by osmosis because they grew up with it. We've got to provide this know-how in other ways. We are putting out what we call technicians, for want of a better term, with know-how and ability to work. We better continue by doing a better job.

We'll face fantastic changes. We have already. The agricultural changes in the last 25 years are greater than the previous 200. Rest assured this will continue. The good farms will have their own inseminators, their own bookkeepers and money managers, their own secretaries, their own salesman, their own buyers and sellers. A duck farmer on Long Island already has hired a Ph.D. to plan his breeding! A New York poultryman has a man to run his IBM machines for pedigree work. There are lots of things to be done in agriculture and we'll be right in the middle of it. But, we better get some manpower ready - some agricultural technicians, if you will. Could these ag technician jobs become so good we would take three years to train?

I have said things not new to some of you. I would like to hope that I have brought out at least one thing new, different or usable to each of you. We have a great area in which to work; what can be greater than agriculture and young people? What a combination! Money will come - it is coming, we know. Let's work on this preparation of young people as we've never worked before. Let's get the equipment and facilities!

At the 54th Annual Professional Improvement Conference of the Association of Teachers of Agriculture of New York held last month, a patriarch of ag teachers retired. I would like to close with part of the story he used. If you don't believe you live in the best country in the world, go to that country; if you don't think you live in the best state in that country, go to that state; if you don't think you live in the best community in that state, go to that community; if you don't think you have the best job in your community, get that job. Gentlemen, we have the best job in the best country, in the best state, with the best young people and I hope our best efforts are good enough.

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FACILITIES AND EQUIPMENT FOR AGRICULTURAL TECHNICIAN PROGRAMS
AT
STATE UNIVERSITY AGRICULTURAL AND TECHNICAL INSTITUTE
FARMINGDALE, NEW YORK

The Farm

130 acres crops
20 acres fruits and vegetables
12 acres pasture, paddocks, poultry range

The Dairy Herd

44 cows
44 head of young stock

	Herd Average	
Year	Lbs. Milk	Lbs. Butterfat
1960	14,074	531
1961	15,572	597
1962	14,839	568
1963	15,679	600

Beef

18 brood cows
1 bull
10 heifers
13 steers
16 calves

Sheep

20 ewes
1 ram
20 lambs

Swine

5 gilts
15 shoats
10 brood sows
2 boars
25 pigs

Poultry

2000 layers
pullets
meat birds
turkeys
7500 lbs. chicken and turkey meat
20000 doz. eggs sold annually

Buildings to House the Above Livestock

4 upright silos
Portable hog and poultry shelters
Meat and Meat Products laboratory including:
- Slaughter room
- Cutting room
- Walk-in refrigerator

Granery
Fertilizer and pesticide storage building
Machinery storage sheds

Ornamental Horticulture

20,000 sq. ft. of glass
4 acres nursery
6 acres instructional gardens and flowers
1 acre pinetum and shrub collection
Campus

Classrooms

Approximately 20 of conventional type
5 with tables
1 drafting room

Laboratories

1 Soil Science
1 Botany
3 Farm machinery and mechanics
5 Food Technology
1 Microbiology
1 Chemistry
1 Combination Botany and Zoology
1 Poultry killing room
1 Poultry evisceration and processing
1 Microtechnique
1 Flower arrangement
1 Propagating
1 Potting
1 Fruit grading and packing

Farm Machinery

12 tractors
4 plows
4 disc harrows
1 spike tooth harrow
1 potato planter
2 corn planters
3 grain drills
1 cultipacker
3 tractor cultivators
1 row crop sprayer
1 orchard sprayer
Several small sprayers and dusters
3 mowing machines
2 side delivery rakes
1 baler
1 field chopper with 3 heads
2 chopped feed wagons
2 silage blowers
1 potato grader
1 apple grader
1 livestock scale
1 feed grinder
2 silo unloaders
2 elevators
3 trucks
Several 2-wheel trailers
" 4 " "

Other Equipment

Rod washer
Blancher
Exhaust box
Retorts
Mixers
Stoves
Incubators
Poultry picker
Automatic feeder
Bulk tank
Milking machines
Gutter cleaner
Multiplate freezer
6 freezers
Plate pasteurizer
Tank pasteurizer
Homogenizer
Bottle washer
Bottler
Sweet water tank
Cooler
Milk pump
Ice cream freezer
Walk-in freezer
Large walk-in refrigerator
2000 bu. apple cold storage
Root cellar
Electric and gas welder
Microscopes
Blue printer
Drafting tables
pH meters
Ovens
Balances
Maps
Centrifuges
Colorimeter
Wiley Mill
Autoclaves
Chemical apparatus
Microbiology apparatus
Botany apparatus

Other Equipment (Continued)

Holding tank
Dynamometer
Projectors and screens
Zoology equipment
Majonnier tester

1963-64 Sales

Dairy and livestock products	$56,812
Eggs and poultry meat	12,375
Fruits and vegetables	15,300
Flowers, plants, shrubs, etc.	10,000

AGRICULTURAL TECHNICIAN PROGRAMS AND THE FARM EQUIPMENT INDUSTRY

by
Merritt D. Hill
President, J. I. Case Company
and
President, Farm Equipment Institute

Just two weeks ago the chairman of the board of the Pillsbury Company, Mr. P. W. Pillsbury, addressed a vocational agriculture teachers breakfast in Minneapolis.

In his brief, but very interesting talk, he included some informative statistics which speak well for vo-ag training and the vo-ag educators of this country.

According to Mr. Pillsbury's figures, a total of 2,758 vo-ag students graduated from Minnesota high schools in 1963. Six months later, 40% of these students had either entered the armed forces or had gone on to further their education. About one-fourth of these young people were enrolled in agricultural colleges or were taking agriculture-vocational courses.

And a little over 50% of the balance of the graduates were actively engaged in farming or closely related businesses. Thus, approximately 60% of these farm youths were engaged directly in agriculture, agri-business, or were attending ag schools. It can be assumed that those in ag schools intend to make some form of agricultural activity their life work.

Again I say this speaks well for vo-ag training and the fine work that is being done by the teachers who are devoting their lives to this worthy cause.

Even more encouraging in Mr. Pillsbury's figures was the fact that only slightly more than 1% of the vo-ag students were unemployed six months after graduation. Compared with the national unemployment average of 15-18% for this age group, I believe this is a wonderful testimonial. It indicates that there is a place for our agriculturally trained people in this country and it shows, too, that such people are eagerly being sought by employers. If this is true for those with only a high school education, imagine the demand for technicians who acquire another year, two, or three of specialized training.

And that is what we are here to examine today. At least for the next hour or so let's look at the relationship of the agricultural technician and the farm equipment industry.

Briefly, what exactly is the farm equipment industry? There are two distinct, but related, divisions to this business. One, of course, is the manufacturing end -- the other is distribution. Each needs the other. Together they comprise the farm equipment industry as we see it today. And because each is so vital to the other I'll attempt to cover them both here today.

Next, exactly what is an agricultural technician in the eyes of the farm equipment industry? Actually I believe he can be anyone who has had some specialized training in a technical area and is applying that training in a practical way. Now a technician can be such in varying degrees. He may be a person who mechanically checks out operations of a machine, follows a test, or performs some other function to which he is assigned. Or he may be engaged in some action which has a greater degree of responsibility but somewhat less than that assigned to the fully qualified engineer. In other words, a technician can have varying degrees of responsibility dependent upon his abilities and training.

In the farm equipment industry, like in others, technicians are employed in a wide variety of jobs, directly or indirectly supporting the work of all types of engineers or other specialists, under close supervision or with relative independence. They may perform relatively routine tasks or they may perform complex work involving intricate or delicate instruments or apparatus.

By the performance of such assigned duties the technician thus relieves the engineer or scientist or executive of the more routine aspects of their responsibilities. These men thus free themselves for the more important parts of their job to take advantage of their more advanced knowledge and training.

At the same time, through diligent and thorough performance of his tasks the technician may advance to a full professional status, particularly if he supplements his on-the-job experience with additional study and acquisition of theoretical knowledge.

Specifically, how many technicians are there in the farm equipment industry? I'm afraid that is rather difficult to answer. It would require a wild guess which I won't hazard. Perhaps there are sources of such information. I haven't located a complete and accurate one.

A government report[1] recently released shows results of a survey made in 1961. This report indicates that there were approximately 5,500 technicians in the farm equipment industry and that this figure worked out to 79 technicians for every 100 engineers and scientists in the industry. Also the report indicated a 5% increase during the previous year.

I heard of one survey recently that indicated the need in the State of Iowa alone for 1,000 additional dealer service technicians. If Iowa dealers can absorb that many, what about the rest of the country? And what about those needed by the many manufacturers in this business?

Part of the reason for the inability to accurately determine the number of technicians required lies, of course, in that the title of technician is applied to varying types of jobs. There is, as far as I can determine, almost no standardization of titles between firms. And even less agreement exists as to what qualifies an individual as a technician. To narrow it down to agricultural technician throws up another set of standards and qualifications.

You might also ask -- Is there a growing need for technicians in the farm equipment business? To this I'd have to answer with a definite "Yes".

Ours is different than other industries in some ways, similar in others. Perhaps because of the nature of the "beast", our industry does not require the highly automated procedures found in industries supplying consumer goods in countless numbers. Our production, although automotive in nature, needs nowhere near the automatic methods employed in manufacturing automobiles. Actually this is a matter of economics based on the lower production volume.

Even so, we are advancing technologically. Ten years ago a computer was unheard of in this business. Today each of our plants has a highly developed computer system and the largest plants have complex computers which perform many and varied tasks. All of this, therefore, requires technicians for operation of the computers and related equipment as well as other modern machines. This is only one example.

Incidentally, these technological advances have not eliminated employees. Actually today our company, for one, is near its highest peak of peacetime employment and I'd guess the same probably may be true industry-wide.

You are well aware of the trend to fewer farms and larger ones. The need for technicians on such larger farms has probably been discussed, or will be, during the course of your program. This trend forces changes in the operations of the farm equipment industry, too. And affects favorably the employment and utilization of technicians.

Our engineers are constantly under pressure to come up with the type of machinery necessary to meet the modern needs of food and fibre production. The technician, again, as the engineer's helpmate plays an important part in this development.

I can say for almost a certainty that this industry as a whole would prefer to hire people who have an agricultural background rather than those without this experience. For whatever job you might name, if a person has been reared on a farm he has the knowledge of the situations and problems which exist there. This gives him an inside track.

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[1] U. S. Department of Labor, Bureau of Labor Statistics, "Scientific and Technical Personnel in Industry in 1961 -- NSF 63-62." Prepared for the National Science Foundation.

I can't say it is an automatic or magic phrase for being hired to say, "I was born and brought up on a farm." Many -- probably most -- of our engineers or employees in any area never lived or ever worked on a farm. But I do believe it generally helps to have had that experience.

Not only is the experience helpful but also we find that the farm-reared young person often has good work habits and greater stability and character than the urban youngster. Now I do not mean this to sound like a hard and fast rule. But the farm youth -- even today -- is not exposed to the many diversions of interest the city boy or girl is. Also, the farm youth usually directs his activity in farm-related directions through 4-H or FFA work. Add to this the fact that the farm family is a more closely knit unit than the average city family and you have the reason for a larger percentage of farm youth growing up as stable citizens as compared with city young people.

For this reason we in the farm equipment industry look to the farm for a supply of recruits to join our ranks. Although this supply is dwindling it will ever be there because all the young people born on the farm definitely cannot be used on the farm and eventually must seek other pursuits. We hope to interest a good percentage of them in becoming associated with the manufacturers of farm equipment.

Well, now that I've put in the classified ad for help wanted, I should get back to the subject being discussed. Perhaps we should explore it now in a more specific nature.

The farm equipment manufacturer's business consists of these broad categories of activity:

Product planning
Engineering
Materials management
Manufacturing
Marketing
Finance
Corporate relations

Every one of these areas definitely has need for, and actually employs, technicians. However, all do not specifically need technicians who are agriculturally oriented, whereas, others can use the specially trained agricultural technician to tood advantage.

Let's look at these areas one at a time.

Product Planning, as its name implies, is the forward looking area which anticipates the needs of the farmer several years ahead of time. Obviously here is a division where a thorough knowledge of agriculture is a prime requisite. Added to this is the need for technical engineering training as well as a need for foresightedness and imagination. These people need the kind of ingenuity exhibited by men like John Deere and Leonard Andrus who developed the first steel plow; like Cyrus McCormick who produced the first reaper; and like Jerome Increase Case who visualized and then produced a far more effective threshing machine than the groundhog threshers he first used and sold to mid-western frontier farmers way back in 1842.

A very important technical function in the area of product planning is that of research -- product and market.

Those in charge of the product planning function certainly need technicians to whom they can turn with embryonic ideas for further development before referring them to the engineering department for a more practical review and actual design.

This, then, brings us to Engineering -- the area where more technicians are used than any other as far as industry is concerned.

I mentioned a survey earlier which indicated there were 79 technicians in this industry for every 100 engineers. Although the survey was not explicit I believe they intended to indicate that these technicians were in the engineering area -- not spread throughout the balance of the industry where technicians most certainly are used.

Here are just a few of the technician type positions which are a part of this industry in the engineering area. Positions for which there are great needs:

Research & development technician
Systems test technician
Production supervisor
Field engineering assistant
Testing technician
Design technician
Fluid power technician
Diesel engine specialist

And the list could go on and on. At any rate, engineering offers tremendous opportunities for the technical-minded individual who for some reason did not acquire a degree in engineering and yet is capable of and willing to go beyond high school in his training. And, as previously stated, a technician's position is a stepping stone to higher places for the ambitious individual.

A fairly new concept in industry is known as materials management. I perhaps can best define this by comparing the director of that function with a company controller. As you know, the controller is a financial officer who is fully aware of and controls those areas of a company's operations relating to money -- both the income and out-go.

So it is with the individual directing materials management. He supervises the movement and handling of materials within a company. They may be raw materials, work in process, or finished goods.

This type of operation calls for technicians in some areas. Again, agricultural training is not essential but is desirable. For instance, value analysis is a very vital part of this work. This activity calls for people who recognize the balance between design, cost, and operating needs. An example would be of a person who can look at a part and determine whether it can be made better for less money.

Although part of this talent might be intuitive a great deal of the ability comes from training, experience, and environment -- in our case with agricultural surroundings.

Procurement, or purchasing, is a major area of materials management. This type of work calls for people with a definite type of training to perform their specific tasks. They must be creative thinkers, not in the development of great long range projects, but more so in meeting everyday problems and situations which arise.

Now let's take a look at the manufacturing area of the farm equipment industry. When you come right down to it we can't claim that this area is seeking agriculturally trained people diligently. The manufacture of an agricultural tractor or a plow is not much different than the production of a refrigerator or a motorcycle.

The same manufacturing processes are used. Parts are made and assembled. Except for interest, on the part of the technician, agricultural background would not contribute much.

On the other hand, the farm boy looking for a job in industry could certainly find it here and the one looking for a job in the technician area might find it among these:

Quality control co-ordinator for testing machinery off the assembly line
Quality control co-ordinators for checking on vendor supplied components and materials and to determine if suppliers are initially qualified and continue to be qualified to furnish materials
Quality control statisticians to watch for tooling deficiencies and other such items
Field technicians who observe equipment in operation and look for manufacturing deficiencies that might show up only in field use
Junior manufacturing engineers for tool design work
Shop supervisors, including foremen and general foremen positions are ideal objectives for technicians

Laboratory technicians, such as for the chemistry lab, to test steel, paint, etc.
Paint technicians are needed to keep a constant watch on cleaning and degreasing procedures, consistency of paint, proper application, depth of paint, and other such details
Foundry technicians who must constantly test sand, watch cupolas for charge and proper melting characteristics, plus other factors in producing quality castings
Gauge technicians who watch specifications and standards
Production control technicians who serve as dispatchers -- a vital, responsible position
Time study experts improve production efficiency
Data processing programmers and tab operators are truly technicians in modern manufacturing processes

So I say again, there are many jobs in the farm equipment manufacturing business for farm youth although little of it requires their specific background. What it does require -- as in all technician positions -- is interest in the job, leadership qualities, good judgement, and training and experience in the particular field of endeavor.

Once the product is built it must be sold. This is the function of the marketing division. Right now I'd like to discuss this from the standpoint of the manufacturer in selling to dealers -- later I'll cover the dealer's part in this subject.

In marketing the specialists are not referred to as technicians but certainly they qualify as such. For instance, the salesmen -- often referred to as blockmen, territory supervisors, district managers, and by other such terms. These men of almost positive necessity should have agricultural roots. Training is usually in the company's own organization but courses in salesmanship, psychology, and other similar subjects are helpful.

And a step or two upward from this are positions like sales promotion manager, sales manager, and branch manager. These are all field positions in the branch in addition to specialty jobs like parts manager, service manager, machinery supervisor, etc. -- all requiring special training and all best filled by agricultural specialists -- technicians, if you will.

Marketing also includes such positions as product education specialists -- the people who design the programs for informing both field people and dealers about new products, as well as standard items. Real technicians, these.

And advertising -- here, too, is a place for agriculturally trained people who are in addition, trained as writers, promoters, and in other ways.

You may not think this too important, but when you put something into print that will be read by a potential audience of several million farmers you just can't take a chance on looking ridiculous. One obviously amateurish statement or an impossible illustration could put a questionable stamp on your capabilities.

Or how about the artist's illustration that showed a two-row cultivator on a tractor but three rows were revealed being cultivated behind the tractor?

Then there was the fence company which showed their product but also in the picture was a harrow hitched to a tractor. A couple of children were standing on the harrow and someone was at the tractor controls. This illustrated poor safety practices. A farm equipment manufacturer can't condone that.

Yes, we must be careful of such errors as well as those that appear in copy. The advertising technician who knows his agricultural subject can prevent them.

One particular marketing position which really classifies as a technician's job is one sometimes referred to as product manager. What I mean is a man who spends most of his time in the field watching his company's product in action as well as the products of competitors. These men must know their product and that of the other company's. They watch for trends in new machinery. They help introduce new products. They are the liaison between the sales department and the farmer himself. These men are so specialized they are assigned to a particular line -- such as tractors only, or tillage tools only.

The service department in the farm equipment manufacturer's operation is full of agricultural technicians and more and more are needed. Here is definitely a place where agricultural specialists are sought and with farm equipment becoming more complex better trained people are required.

It is no longer possible to jump from high school into such a job. Several years of specialized education and training are necessary. In hiring a young man to enter the field service section of our company -- and I'm sure I speak for the industry -- we look for a farm-bred youth who has completed high school and gone on to college for at least a year or two, or has taken specialized courses at college or in vocational schools. He must have leadership qualities and good judgment besides a thorough knowledge of farm equipment. We may even find him in a retail dealership.

After we hire him he goes through intensive training in our own organization both at home office and at branch level. And he is constantly kept up-to-date with refresher courses.

The service technician must be able to diagnose troubles as well as repair equipment. Although we don't expect our company service people to perform the actual repair work they must be able to do it if required. In addition, they must be capable of conducting meetings and service schools for dealers as well as determine whether warranty adjustments are justified or not.

In other words, the service man of the manufacturer is not a "grease monkey"; he is really a manager.

It is such positions as these which are really technician positions and which do not show up in statistics. Thus the real opportunity for technicians in this business is far greater than any statistical survey might show.

I listed two other areas in the farm equipment business requiring technicians but since these, like manufacturing, seldom require agricultural specialists we can dismiss them quickly. Not that they are not important, because they are. And they, too, welcome farm youth -- but don't put that down as a prime requisite. I refer to the financial area and that of corporate relations.

Each of these areas has its technical specialists who need not have college degrees -- accountants, computer operators, personnel specialists, labor experts, etc.

Now here is an area you probably may never have given a second thought to as a location for agricultural technicians. That is in the field of credit. Several of the full-line manufacturers have their own credit corporations. Others work closely with independent credit companies. In every case, however, the manufacturer -- particularly in his field credit people -- wants people knowledgeable in agricultural activities. Just like the rural area banker, the manufacturer is aware of the value of the credit man who knows how the farmer thinks, works, and lives. The farmer will trust and have confidence in someone who "talks his language" far more than someone who is completely unfamiliar with agricultural pursuits.

Therefore, the credit man who helps arrange the loan as well as the collector should be agriculturally-oriented.

This has been a quick review of some of the technical positions in the farm equipment industry -- but sufficient for our purpose here today.

One of the questions posed to be discussed here was, "What should these agricultural technicians know and be able to do?" Obviously, to answer this would require taking each particular technician position separately and analyze it. Since we do not have that much time, suffice it to say that each has its particular specialized requirements. In some cases there are schools to convey this information -- especially in the general areas rather than the specialized agricultural areas. But most of the training comes right on the job. And as stated before, preference is exhibited for those people who have farm background.

Another question suggested was -- "What kind of working relationships should be developed between the educators responsible for technician training programs and the farm equipment industry?"

First of all, I must say with certainty that there are too few such programs; that is, too few agriculturally-oriented school programs.

The typical engineering technician course, computer technician course, and specialized training courses in many areas are available in almost every community throughout the country. Cities of 25,000 people have them. The vocational schools in large municipalities have them. Colleges and universities everywhere have them.

I would like to talk for a few moments about a school for the training of what you might call technicians for business; that is, for business in general, including agri-business. To my knowledge there is no other educational institution exactly like this one.

I refer to the Northwood Institute[2] which was founded in Alma, Michigan, in 1959, and now located at Midland, Michigan. This school is actually a preparatory college for people entering the business profession. It is a two-year course which provides a practical bridge to business.

The philosophy of the school which is impressed upon its students may be summed up somewhat as follows:

> "Learn what you can contribute to the American system of free enterprise and you won't have to be concerned with the compensation you will receive."

This school attempts to inculcate in its students all of the American ideals of the various "freedoms" plus the well-known American heritage of "work".

This school teaches courses in practically every phase of business and during its five years of existence has the enviable record of placing every single one of its graduates. American business certainly needs additional training grounds of this type. Those of us in the many areas of agri-business certainly could utilize graduates from this type of school and as I have said before, if they were agriculturally oriented they would be of additional value to our type of work.

There is a definite consciousness for the need for technicians with less than four-year college training. And these needs are being met. The main problem seems to be that there are insufficient candidates. But more of that later. As for school programs with agricultural emphasis, they are few and far between. True, there are short courses to prepare better trained farm operators and there are courses for farm equipment dealers -- which I also want to go into detail about later -- but for technician training for the farm equipment industry specifically, this is virtually nonexistent.

Perhaps this is partly the fault of the industry itself. We may not have sufficiently encouraged this type of course in the schools.

Wherever the fault may lie it is a fact that such schools would be of great help. And industry would help in their establishment and continuity. The management of farm equipment firms would gladly work closely with schools in this activity. The larger companies would be best equipped to assist in this. The smaller companies, merely because of lack of personnel, might find themselves hard-pressed to be of much help but surely those in very specialized phases, I'm sure, would do what they could to help educate youth in the modern methods of agricultural production.

Industry has a fine reputation for working closely with the schools, with the vo-ag instructors in developing courses, furnishing materials and equipment, supplying lecturers, offering assistance in many ways. In fact, some of the larger manufacturers have people assigned to the work of college and university relations. These people would be especially helpful in developing technician courses.

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[2] For information contact: Henry Little, Campbell-Ewald Company, 3044 West Grand Boulevard, General Motors Building, Detroit, Michigan 48202.

Another way in which industry could -- and is willing to help -- is through cooperative work-study programs. Presently most of the full-line companies do just this in working with agricultural colleges. Students may attend college for a quarter or two, then work for a quarter or two. The combination of school and work differs. in various courses and various colleges but is mutually worked out.

There is no reason at all why on a technician program of, say, 18 months the student could not attend school for six months, work six months, attend school six months. The combination of theory and practice would produce a well-rounded technician.

As stated previously, the manufacturers would gladly supply people to assist in advising how to organize courses as well as to lecture to classes. However, it cannot be expected that they would provide a sabbatical leave to key personnel to teach or otherwise assist in such programs. This is a bit too much to expect. However, should the program be considered worthy of cooperation to such an extent it is possible this could occur. Each request for assistance from schools is considered individually by all manufacturers.

But this is a two-way street. Educators should come to industry for advice as to what kind of people are necessary now and in the future, and what kind of training is suggested to qualify prospects for jobs in industry. This should be a continual contact so that schools are constantly up-to-date on the needs of industry.

In addition, industry should further the practice some companies engage in and that is the providing of scholarships for specific areas of study.

Now I would like to review in detail for a few minutes a program of agricultural technician training which has fairly widespread recognition. This is in the area of dealer operations.

One of the world's great contemporary salesmen -- "Red" Motley -- has often said, "Nothing happens until someone sells something."

How true. We can engineer and manufacture and distribute a product to a dealer. But unless that dealer sells that product to a customer who puts it to use nothing really happens.

The farm equipment industry relies upon the dealer organization to sell its wares. Of course, the manufacturers help the dealers in every way they can but the dealer still has to sell the product, service them, supply parts for them.

And the dealer has to perform those functions in the most efficient and profitable manner. It is, therefore, gratifying to note the way in which dealers, dealer associations, and colleges and vocational schools are cooperating and collaborating on technician training programs.

I don't wish to offend any schools by failing to recognize them for their courses so I won't refer directly to any of them. Most of them, however, are operated in close cooperation with their respective state dealer associations.

A study of the programs offered by these various schools shows some similarities -- some wide differences. To generalize one might do it this way. Those courses given on college or university campuses lean slightly or heavily toward the business management side, whereas, those taught at the vocational school level seem to concentrate on the training of servicemen as better mechanics.

Now there are exceptions. For instance, a vocational technical school in Minnesota has a fine course for dealer partsman training which has heavy emphasis on management operations such as merchandising and salesmanship, accounting practice and inventory control systems, and clerical work, in addition to farm equipment assembly and disassembly. In fact, the course is about 55% on the business area and 45% mechanical.

Nor do these courses shirk the associated knowledge which is so necessary for good dealership operation. For example, most universities include such courses as soil science, drainage and irrigation, rural electrification, and similar subjects to give the trainee well-rounded agricultural knowledge.

In most cases these schools also incorporate classes in speaking and writing and social graces. This type of course is most important.

The farm equipment industry is favorably impressed with these attempts to improve dealership operations through the training of specialized technicians in service, parts, and dealer management. However, most full-line companies provide their own assists in these areas, too. The branch houses, as well as home offices, constantly provide training and assistance for both parts and service men. We are aware of excellent training schools offered by most manufacturers to dealer people. These are not intended to substitute for the courses set up by the schools but to supplement them. The manufacturer's courses concentrate on their own brands primarily. The dealer mechanic must know all types of equipment. This he can be taught at the general school level and through on-the-job experience.

Also, the manufacturers provide management training courses to assist their dealers. By already having such facilities the manufacturers are ready, willing, and able to assist schools in providing the right kind of basic training for beginners in this field.

You may be interested in some comments from educators relative to these programs -- their success, their shortcomings.

In general, reports from the schools reveal that there are more jobs available than there are qualified people to fill them. The schools report that it is difficult to find enough people to take their technician training courses. They see it this way -- most people go into four-year courses because of today's demands for degrees. Also because farm equipment and farm business is so complex today it requires more training than heretofore to accomplish the tasks. Thus the two-year course may lack depth, some teachers claim.

Another deterent, as the schools see it, is wages. It is their claim that dealers do not pay a high enough starting salary and yet expect a lot from the new trainee. They would recommend consideration of a starting salary based on potential, not lack of experience, and at the same time realize that the new man must take a few months to become adjusted. They feel this will pay off rich rewards in time.

Another problem facing the schools is that too many farm boys are still leaving the farm to go into other pursuits. Educators feel that the farm image is still not as inviting as it could be. Publications circulating in agricultural areas lure the farm youth into electronic, aircraft, and other areas of more romantic sounding futures. No inducement is given to stay on the farm or in agri-business.

One school reported that of 97 graduates from its farm equipment service and sales program, over a period of six years, 43% were employed by farm equipment dealerships and 17% in farming or in other agri-businesses. The remaining 40% went into automotive, construction, or other industry, plus the armed forces, or continued on with school.

The school spokesmen are highly complimentary regarding the cooperation received from agri-business firms in the operation of the schools.

Today we are faced with another situation. Actually, it produces sort of a paradox.

We hear so much of unemployment due to loss of jobs through waning industries such as mining. Or the claim that automation has replaced certain skilled or unskilled people. Or that people are leaving the farm in droves. To help combat this the federal government has instituted the Manpower Development and Training Act.

If, as has been reported, there are just not enough good farm mechanics and partsmen to go around, this should provide a fine source of employment for retrained people. Some of the people currently unemployed according to government surveys are farmers who have turned from farming. They would be naturals for retraining. However, to my knowledge, little has been done in this direction.

Three such retraining facilities have come to our attention. One is at Higginsville, Missouri, and was started by the Western Retail Implement and Hardware

Association of Kansas City. Another -- a special 48-week course at Milford, Nebraska's vocational technical school which already had a course for farm mechanics in operation. The third is being readied in Wausau, Wisconsin. I presume there may be others.

The Farm Equipment Institute through its educational policy task committee is working with the U. S. Department of Health, Education, and Welfare on this problem. In fact, on this very day this committee is in Washington discussing the various ways in which the farm equipment industry can cooperate in retraining people to fill jobs that are ready and waiting with people who have the aptitude for them and are trained to fill them satisfactorily.

Among the aspects this group is exploring are the true employment opportunities available, the purpose for the training, the educational level at which is should be conducted, and the relation to programs now in existence.

The Farm Equipment Institute, of which I currently have the privilege of being president, is a trade association of most of the manufacturers in this business. Although definitely competitive in the conduct of business, this group unites strongly for universal beneficial action not only for the industry itself but for dealers, and in many ways which save the farmer money and improve his operations. So it can be with this latest activity -- coordination of effort to obtain trained people for the dealers and the manufacturers while at the same time supporting the government MDTA program.

We have spent some time covering the highlights of the topic at hand. I'm sure it is obvious that this subject alone could easily develop into a full week's seminar.

I'd like to summarize briefly:

1. Many technician positions await the trained and qualified person in the farm equipment industry.

2. The individual seeking training in this area should have interest in it, ambition to succeed, preferably some agricultural background or experience, and leadership qualities.

3. The farm equipment industry stands ready to share its know-how and contribute in any way it can with personnel, equipment, study aids, and the like, to help institute and operate such programs.

4. While learning the trainee can pick up experience and some of his expenses through a cooperative work program.

5. Finally, the industry also will help in any practical way it can to promote the Manpower Development and Training Program.

In closing, I would like to repeat my plea to you to work closely with industry in developing the right kind of people in the right kind of way for all phases of agri-business. Encourage farm youth to investigate first the advantages of remaining in this area -- his chances of advancement are probably better here than elsewhere.

And finally, keep up the good work of molding the character of our farm youth. We're proud of the job you are doing.

Mr. Merritt D. Hill, President of the J. I. Case Company and President of the National Farm Equipment Institute, is shown visiting with Dr. Walter M. Arnold, Assistant Commissioner for Vocational and Technical Education, U. S. Office of Education, and Dr. Robert E. Taylor, Director of the Center, following his presentation at a luncheon meeting.

One of the stimulating features of the seminar was the "table talk" following the presentations of consultants. A table group is shown discussing questions to be raised with the consultant. Members of the discussion group are (left to right): Robert Hodges, Oklahoma; L. C. Dalton, New Mexico; Windol Wyatt, Iowa; F. E. Kirkley, South Carolina; Floyd Johnson, South Carolina; Jesse Taft, Massachusetts; Neal D. Andrew, New Hampshire; and Robert E. Taylor, Director of the Center (standing).

PANEL:
DEVELOPING EFFECTIVE RELATIONSHIPS BETWEEN AGRICULTURAL TECHNICIAN PROGRAMS AND OTHER AGENCIES, ORGANIZATIONS, AND INSTITUTIONS

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Robert M. Knoebel
Director, Technical Education Branch
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Introduction by Dean Kottman

The mission of our panel here this morning is to offer direction to a discussion involving the development of effective relationships between agricultural technician training programs and the several organizations represented by the members of this panel. These men represent (in alphabetical order) the Head of the Department of Agricultural Short Courses at the University of Minnesota; the Executive Vice President of the Ohio Grain and Feed Dealers Association; and the Director of the Technical Education Branch in the United States Office of Education. When my own background in the areas of undergraduate instruction, research and extension is added to the specialized backgrounds of these men, it would seem to me that we have the potential for our coming up with a rather wide range of relationship potentials as they might relate to our respective organizations and the agricultural technician training programs which are the subject of this seminar.

At this time, I should like to present each member of the panel so that you will know a bit more about the person speaking to you. I will then ask each individual to make a brief statement. When all four of us have completed our formal presentations we hope that there will be a considerable amount of discussion among the four panelists as well as questions and comments from you folks who are the participants in this seminar. We hope that each one of you will respond freely in terms of questions and discussion.

Presentation by Dr. Freeh

I believe that the basis for effective and efficient relationships between agricultural technician training programs and organizations, agencies, and institutions is understanding.

I believe this understanding must begin with each of the various agencies, units, and institutions concerned with, or responsible for agricultural education, recognizing that the other units and agencies exist--and that what each unit is doing is important--and exerts an influence on all units and institutions in agricultural education.

Beyond recognizing the existence of the various units and agencies, we must develop a clearer understanding of each other: How we are organized; what we are attempting to do--and why--and let's do this because we want to, not because we have to (although I'm not sure that we aren't rapidly approaching the point where the latter is the case).

As a coordinated body (all units, agencies, and institutions), let's analyze the environment and situation in which we find ourselves--in which we are moving to develop technician training programs. Then, let's pool our available resources and determine what needs to be done--why it needs to be done--how and where it might be done.

Let's push all of the chips into the center of the table and then use them in the most effective and efficient manner possible.

How do we develop more effective and efficient relationships? I would offer these suggestions:

1. Let's begin by taking the initiative--all units and agencies involved. Let's divest ourselves of any "defensive," "standoffish," or "lack of time" attitude and invite people to sit with us--and advise us as we develop our programs and policies--and let's not wait for the other unit or institution to take the initiative. Let's do it ourselves.

2. Let's give of ourselves and our resources. By word and by deed, let's make it be known that we are interested in working in close coordination with all other units and institutions in developing not only the technical training program, but all other agricultural education programs--at all levels.

3. Let's take some time to redefine our roles, responsibilities, resources, and competencies--as we see them--and let's ask the other units and institutions to do the same. Then, let's get together and hold discussions. With this as a base, let's come up with a state plan which encompasses agricultural education programs at all levels--and in all areas--subject matter as well as geographical. If we need to be a gadfly to get the job done, let's be a gadfly.

4. Let's communicate--let's not operate in isolation to the extent that we sneak up on each other or surprise each other (knowingly or otherwise)--and in this manner lay the foundation for rumor, misunderstanding, and inefficient and ineffective relationships.

If it seems I am overstating the case, just reflect on how many times you have heard people say, "What we need to do is to involve more people in our discussions and in our planning in order to be truly successful," but--and here is the key statement--too often these same people go on to say, "We didn't do this too well when we developed such and such program (because of lack of time, urgency of developing the program, etc.), but it should be done."

It would seem that we need to establish some new priorities for the use of our time--and possibly on the top of this list we should place the development of more effective and efficient relationships.

Where does one begin? I would say--

Why not begin with a two- or three-day state seminar involving all units and institutions responsible for, or concerned with agricultural education--and I include business and industry? I would see the objectives of this seminar to be--to develop a better understanding of each other--our roles, our responsibilities--and our plans for the future.

As an outgrowth of this seminar--I would see the establishment of a state coordinating-advisory committee for agricultural education--with representation from all units and institutions involved. This committee (in an advisory capacity) would have responsibility for developing a state plan for agricultural education which outlines such things as:

1. The needs for agriculturally trained workers;

2. Type and level of training and education the various types of workers require (including technician training programs);

3. A description of the various units, agencies, and institutions which might be involved in the various types and levels of agricultural education;

4. Some guidelines for developing and carrying out the various programs.

Perhaps this sounds trite and a waste of time--but is there a better basis for developing effective and efficient relationships?

Beyond developing a state plan, I believe the state advisory committee should have responsibility for:

1. Promoting and coordinating research;

2. Stimulating and developing more effective communications.

I am not advocating that every time a unit or institution wishes to plan or do something it should assemble the committee. Nor am I advocating that the committee serve as a state governing body for agricultural education. I am advocating, however, that such a committee set some guidelines for the future development of agricultural education at all levels in the state.

Once these guidelines have been developed, in order to maintain effective relationships, I believe that the committee should meet periodically during the year. In addition, I believe that an annual two- or three-day seminar should be held involving broad representation from all units and institutions involved (the National Center idea on a state level--and who's to say this week hasn't been well spent?).

And why not a state publication for agricultural education, published at least quarterly, which contains information on happenings, developments, plans, and projections as related to all agricultural education programs at all levels. I offer it as an idea.

Tying my remarks back to my own area of responsibility, university short courses, brings us to the inevitable question--where do university short courses and short course units fit into all of this?

Before I give you my answer to this question, let me attempt to clarify the term "short courses". I do this because a national study we conducted last year indicates that while there is a great deal of similarity between short courses and short course units around the country, there is also a great deal of difference. In fact, the only similarity in some cases is the title.

The term "short course units" as I shall use it today refers to those units which have responsibilities for post-high school, non-degree, or less than B.S. degree programs offered by colleges of agriculture or their equivalent at our land-grant institutions. These programs can be classified as:

1. Collegiate or post-collegiate (two years or less in length);

2. Non-collegiate programs (one to two years in length or less than one-year in length);

3. Specialized short courses;

4. Conferences and workshops.

A more detailed description can be found in the national report. Only one institution offers programs in each of these areas, while quite a number offer programs in two or more areas.

Some basic characteristics of short course units are:

1. They have a broad range and variety of resources at their disposal.

2. They possess mobility and flexibility in their programming.

3. They are in a position to react quickly to problems and situations.

4. They are not, for the most part, tied as closely to tradition, regulations, established practices, curricula, or time schedules as other units concerned with agricultural education.

What is the role of short course units in developing more effective and efficient relationships? I will answer the question in this manner. Many short course units have for years been carrying out the types of programs we have been discussing this week. In doing this, they have met and overcome some of the problems we are concerned with. They have developed technician training programs; they have trained people for technical occupations; they have placed people in technician positions. They have a close tie with university faculty, with business and industry, with employers, with teacher educators, with state supervisors, with vocational agriculture instructors, parents, and others who influence prospective students, and they have built a following in many walks of life.

Because of this, they are in a position to offer an abundance of information and advice. They are in a position to offer assistance, and they are in a position to coordinate.

In their unique position--with one foot in the university, one foot in business and industry--working closely with all units responsible for or concerned with agricultural education, they can serve as a most effective means or basis for developing effective and efficient relationships. I believe short course units have an inescapable responsibility for doing all they can in this regard and I believe other units have a responsibility for making sure that they do it.

Thank you.

Presentation by Mr. Greenleaf

I feel sincerely honored to have this opportunity of speaking to you for a few minutes this morning as a part of this panel interested in the relationships of the agricultural technician training programs to other agencies and groups. I believe our panel is also singularly honored by the presence here today of such a large number of outstanding leaders in agricultural education, including several who have technical programs of quality and depth already in operation. These following remarks are to serve as a stimulant for your questions in the discussion period that is to follow.

The topics that you have discussed at this National Seminar during the past three days have been of particular interest to me. The need for technicians in agriculture, the curricular content, staffing, and the other topics are all of the utmost importance, but let us be candid with each other -- at their best they do not produce a quality program of vocational education without strong, friendly, helpful, and challenging relationships between the technical program and the user groups or other educational institutions. My remarks primarily concern the relationships with trade associations, agricultural organizations, and prospective employers.

The technological explosion in all of agriculture, plus the rapid expansion of the off-farm phase of the agricultural enterprise, has brought about an increasing need for semi-professional workers -- agricultural technicians. In most areas of agricultural endeavor, the trade associations or agricultural organizations recognized the need several years ago. Most of them are busy, in their own way, in developing and training these technicians for their particular area of agricultural service.

Our Association, The Ohio Grain & Feed Dealers, serves a membership of about 800 country elevators, some feed mills and grain terminals, including both the independent and cooperative industries. It occurred to me that you might be interested in the relationships that our own association has developed in the search for ways and means to obtain technically-trained personnel for our industry. We have encouraged and assisted in the development of a technical program in agri-business in a nearby city school system. We helped in the recruitment of students, in the development of a program of instruction, and plan to assist in the placement of these young men for training. We are in our second year of arranging on-the-job training for degree program students from Ohio State's College of Agriculture. The student must complete a marketing textbook and write a critical paper on his placement experience. Stress is placed on the learning experience -- the after-work conferences with the manager, etc., instead of a lucrative wage incentive. Much more use of this practical training tool could be helpful in building industry-education relations.

Our industry is proud of the basic management development program that we have built with the assistance and cooperation of the Ohio Cooperative Agriculture Extension Service and Ohio State University's College of Agriculture. In the four years of its operation we have graduated 67 managers from this 15-day educational program. In addition, we have about 200 more managers in the program with 3 to 12 days of work already completed. We have recently finalized plans for a "graduate" program for those that complete the basic program.

Our Association's Education Committee has always developed and planned educational programs with the leadership and assistance of representatives from educational institutions. In fact, as of last year, the relationship had been so strong, frank, and friendly, that three educators were included on our 17-member education committee. One representative is the coordinator of the technical school, one from the Agricultural Economics marketing area, and one from the College of Agriculture -- the administrative assistant to the Dean. We must plan these relationships -- work to create situations for joint working relationships. In addition, much help can be given the educational institutions through use of trade leaders as advisors and consultants for testing your new programs and ideas. This is working well with both the College of Agriculture and our Vocational Education Section of the Ohio Department of Education. Necessarily, the relationships between a technical program and a group will vary with the management, personality, and organization of the respective agencies or groups.

Never lose sight of the constant need to keep others informed of your program and plans. Frequent use of the telephone, luncheons, a golf date, etc., will bring about the close personal ties that allow people to confide in each other freely and with confidence. It can be one of the most important ingredients of your technical training program.

I would like to spend a few minutes in the area of problems that seem important if we are to be both effective and efficient in developing and maintaining adequate relationships between industry and the educational institutions in the promotion of a technical level education in agriculture.

1. Leadership -- it may take some nerve to stress this factor to you, the leaders of many fine educational institutions. However, I honestly believe that responsible, daring, creative leadership is needed -- both in your ranks, as well as in the industries of agriculture, of which I am a part.

2. Appreciation -- by educators, of the worth and value of technically-trained people in agriculture. Time will not permit me to adequately spell out the thrills that have been mine in leading frustrated, young high school students into a role of leadership in some agricultural business.

3. Appreciation -- by educators, of the role of agri-business in this complex agriculture of today. Your teachers need to have a first-hand appreciation of the role of service organizations to farmers.

4. Recognition -- by industry, that the educational institution can train technicians for their industry. Many of you have stressed advanced work to the detriment of technically-trained agricultural people, and this ground will be hard to develop.

5. Communication -- both industry and our educational institutions often fail to do the necessary and easy work in communications. To accomplish this will take communicators and listeners on both sides.

6. Scholarships -- industry is interested in being sold and when it is once sold will give thousands of dollars to young people as scholarship

grants if the product of your technical program can serve the industry.

It has been suggested that perhaps some specific suggestions to educators might act as a summation to this short paper. I would like to list these seven suggestions as follows:

1. Gather an advisory group from agriculture -- examine your critical technician needs.
2. Sell the idea -- to administrators, industry, staff, and other institutions.
3. Develop the program -- keeping a technically-trained person and the industry in the foreground.
4. Pull all stops -- to work the plan you and industry have made.
5. Develop aid or scholarship programs to boost student morale.
6. Keep staff sold -- use industry for recognition.
7. Improve program constantly with industry's help.

In closing, I sincerely challenge you to get out on the frontier of education -- develop and work with your agricultural industry on an agricultural technical program for the benefit of your farm people and our youth of the 60's.

Presentation by Dr. Knoebel

I am going to try not to duplicate what has been said by Mr. Greenleaf and Professor Freeh. Their presentations have been excellent and they have indicated the direction essential for effective relationships between agricultural technician programs and agencies, organizations, and institutions. I would like to use a few minutes to describe to you some of the relations of the Technical Education Branch with agencies, institutions, organizations and societies, particularly as the relations have been developed in the preparation of suggested curriculum guides.

Some of you have had an opportunity to examine the suggested curriculum guides that have been prepared as a result of the efforts of our staff during the past several years. Included were guides in electrical, electronic and mechanical technologies, and electronic data processing. It should be mentioned that these have been received eagerly by educators and employers throughout the nation. In fact, there is a great demand for material of this type.

It was through the requests from interested persons in the States that the preparation of suggested guides was initiated. This actually was quite an innovation for the U. S. Office of Education. As you might expect, there has been some criticism from certain persons who say that curriculum development should not be the work of the U. S. Office of Education. It should be made very clear that the curriculums developed have not been standard curriculum guides. They are guides for certain curriculum standards, but they are not standard guides. We can say without reservation that there is not a school in the United States in which you will find in use one of the curriculums exactly as it has been published. Then you may say of what value are they? The real value has been in providing assistance to school administrators in planning for technical programs. Also, they have been of special value to advisory committees working on the development of technical education programs within States and within communities. As a result of the many requests for the guides and the many expressions of appreciation received from the users, we are quite confident that the guides are serving a significant purpose in the development of quality technical education programs.

As previously mentioned, four guides have been developed--electrical, mechanical, electronic, and electronic data processing (programming and business application analysis). At the present time, we have three underway--one in civil technology, another in instrumentation technology, and one in chemical technology. Also, plans are underway for the preparation of a scientific data processing programming curriculum guide. Monday of next week, we will be having a review group very carefully go over the civil technology guide which will be the final review prior to publication. We are interested in what might be done in the development of suggested curriculum guides in other areas, particularly in health and in agriculture. It is hoped that before we are finished with our discussion here, you will offer suggestions as to what you believe the U. S. Office of Education might be able to contribute to your efforts for the development of sound agricultural technology programs throughout the country. We are looking for your guidance, your direction.

Now to the relations with agencies, organizations, and institutions. To illustrate, it may be helpful to quickly take you through the steps that have been followed in the development of the instrumentation technology guide that will be available in late September or early October.

Several years ago, the Instrumentation Society of America, which represents approximately 15,000 manufacturers and users of instrumentation equipment, conducted a survey among their membership to determine needs for technicians in the instrumentation field. The results of their survey indicated a great need for persons to assist engineers and to perform duties requiring the practical application of scientific and mathematical principles. It was concluded that a technician-type person could fill these positions.

As a result of our working relations with various national groups, including the Instrumentation Society, we learned of the special need for instrumentation technicians as revealed by the study. We found that the officers of the society were very much interested in doing what they could to help develop a suggested curriculum guide that might be used in educational institutions for the preparation of instrumentation technicians. As a result, a contract between the U. S. Office of Education and the Instrumentation Society of America was developed for the preparation of a guide.

The Instrumentation Society did not have people on its own staff who were capable of doing the educational aspects of this particular project. They went to a long established technical institute with an outstanding record to employ as a consultant an individual who had many years of experience in developing technicians in the field of instrumentation. This person was employed for a year as a consultant. The school was willing to release him and he was willing to serve with the Instrumentation Society for this period.

Following the preparation of a tentative draft of a curriculum, the consultant traveled east and west -- north and south to visit many industries to get their viewpoint of a tentative curriculum. Not only did he visit industries, but he visited numerous institutions throughout the country, both 4-year institutions and 2-year institutions that have successfully provided technical education programs.

Digressing for a moment and thinking of this seminar, we have in attendance people who have had a rich experience in agricultural technology and who could provide significant assistance as consultants in the development of suggested curriculum guides for use in the planning, development, and operation of needed agricultural technician programs.

The consultant compiled suggestions and information he obtained as a result of his visit into a second draft. This second draft was then submitted to additional institutions, societies, agencies, and employers for what might be called a second review. The suggestions and comments gathered on the second go-round were carefully reviewed and a third draft of the guide was prepared for our office.

At this point, we carefully selected other agencies, organizations, and institutions from whom we might be able to obtain suggestions for further refinement and evaluation of the document. I'll mention some of these agencies, organizations, and institutions in a few moments. After obtaining comments and suggestions regarding the third draft from representatives of agencies and institutions, we compiled a draft for final review. For the fourth and final review, we brought to Washington another group of people representing employers, educational institutions, and societies to critically review, page by page, the suggested curriculum guide. Each of the several review groups was representative of different agencies, institutions, and organizations.

When the final review is finished, we prepare the copy for editorial review by the publications branch. Following the editorial review, it is printed and distributed to appropriate vocational and technical education personnel in the States, to interested local school personnel, and to interested employers of technicians.

Whom do we work with? As you have heard in the process of curriculum development, we have occasion to work with many agencies, organizations, and institutions. All of the work of our Branch is facilitated as a result of such relations. I would like to mention some of the agencies, organizations, and institutions that have had a part in the various efforts of the Technical Education Branch.

We have worked with representatives of Argonne National Laboratories. They have been very helpful in determining need for technicians with the preparation of suggested curriculum guides. Representatives of Armstrong Cork Company have assisted with the development of the mechanical technology guide. Persons from Allied Chemical Company, Eastman Kodak, American Chemical Society, the Chemical Manufacturer's Association, Data Processing Management Association, IBM, UNIVAC, Burroughs, and other manufacturers and associations have provided advice and guidance regarding technical education.

Then, too, we have sought counsel from organized labor. It is possible that you may not need to solicit the assistance of organized labor in relation to agricultural technology. However, you may find it very helpful to take into consideration any thoughts they may have regarding the development of agricultural technologies. We have worked with representatives of the National Association of Plumbing Contractors; United Association of Plumbing and Pipe Fitters; Metal Trades Department, AFL-CIO; International Brotherhood of Electrical Workers; and International Association of Machinists. In brief, we have found it has been helpful to work with the national labor organizations.

Also, we are working with representatives of National Aeronautics and Space Administration, Department of Commerce, National Science Foundation, Division of Water Supply and Pollution, American Vocational Association, National Education Association, American Association of Junior Colleges, and American Society for Engineering Education.

Various consultants have been brought to our office on short time assignments to assist us. At the present time, we have from a 4-year institution of higher education, where 2-year technical education programs are conducted, a consultant who will be assisting us in the further development of plans for the promotion, organization, administration, and evaluation of high quality technical education programs in our nation. We are hoping this is a two-way street -- while the consultant is helping us to provide a more complete service to the technical education personnel in the States, we hope we will help him to take back to his institution and also to the agencies and organizations he represents, a national picture of technical education needs, some of the problems of providing quality technical education, and what the U. S. Office of Education is doing to help the States meet these needs and to solve the problems.

I would like to just briefly mention the types of contracts we have had for the guides that have been developed. The electronic and the electrical -- we worked with Oklahoma State University where they already had on-going programs in these technologies. In the case of mechanical, we worked with the State Board for Vocational Education in Wisconsin who had Milwaukee Institute of Technology develop the guide. The Institute has a strong program in mechanical technology. In the case of the chemical technology, we contracted with the State of Connecticut where they had a person aboard as a consultant who was available for this service. The civil technology was developed by the Engineering Department, University of Illinois. They have prepared the draft that will be finally reviewed on Monday.

You will recall that I mentioned electronic data processing. This is a new field. Where do you get information and assistance that will be the outcome of experience? Orange Coast College in California had one of the first educational programs in this field. We entered into a contract with the California State Board for Vocational Education for the work to be done by Orange Coast College. The preparation of the guide by Orange Coast College went through the process that was previously mentioned. Again, many employers, organizations, societies, and agencies gave assistance in the preparation of the curriculum guide.

As a result of the relationships with agencies, organizations, societies, and employers, the guides are not something that has been pulled from the top of the heads of a few people, but rather they represent a rather valid concensus of people throughout the nation who are qualified to determine what should be in technical education curriculums.

In brief, I believe that in your State, institution, or local situation, you have a somewhat comparable opportunity for using assistance similar to that just described. You do have advisory committees. You do have State and local chapters of societies, and representatives of agencies. You do have employers in your area. It is important, as has been pointed out by the panel today, that you use all of these for assistance in determining the type of program that will be most suitable for your particular State or your particular area. So I would urge you to go back and do everything you possibly can to make full use of resources available in agencies, societies, institutions, and employer groups, so that you may have an effective, efficient, and high quality technical education program. Such efforts will provide programs that challenge capable youth, are acceptable to the people engaged in education, and will meet the needs of the employers of your product.

I hope you will feel free to let us have your suggestions as to what you believe we can do in the Vocational and Technical Education Division of the U. S. Office of Education to assist you with the development of high quality agricultural technologies.

Thank you.

Presentation by Dean Kottman

I am confident that there is substantial agreement among staff members in our colleges of agriculture across the nation that we want to do whatever we can best do with respect to meeting the needs of society for technicians and sub-professional specialists. I believe we accept the fact, almost universally, that technicians are becoming increasingly important to our society. The central problem is one of finding ways in which our university personnel can be of greatest assistance in the development of institutions and curricula which will meet the needs of those members of our society who must be educated beyond high school but who, for one reason or another, will not be educated to what has been described as a "full professional education."

Some of the best reasons I have come upon as to why our universities should be concerned about this facet of their responsibilities stem from data included in an address delivered at a dinner meeting sponsored by the Federal Reserve Bank of Cleveland right here in Columbus. Speaking at this dinner on November 7, 1962, Dr. John C. Warner,[1] President of the Carnegie Institute of Technology, quoted from a Bureau of Labor Statistics study made in 1959 with which I am sure all of you are familiar. You may recall that in this study predictions were made that by 1970:

> There will be no more jobs for unskilled workers than now.
> Jobs for semi-skilled workers will increase 25 percent.
> Jobs for professional and skilled technical people will increase by 60 percent.
> There will be 25 percent more 'white collar' than 'blue collar' jobs (in 1910 there were twice as many 'blue collar' as 'white collar' jobs).

Dr. Warner made this comment which is indeed worthy of note. (I quote)

> It is significant that at the same time that we have a worrisome unemployment rate among the civilian labor force, we have acute shortages in almost every profession and skilled vocation. We

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[1] Dr. John C. Warner, "Related Unsolved Problems - U.S.A.," Address presented at the Federal Reserve Bank Dinner, Columbus, Ohio, November 7, 1962. Dr. Warner is President of Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

> have many unemployed, but there is a crying need for trained people as shown by the vast volume of advertising in all metropolitan newspapers and professional magazines by employers seeking all manner of people possessing an almost infinite variety of professional competencies in vocational and technical skills. I believe it is beginning to be pretty clear that economic growth alone in a free society which must compete in world markets with lower-labor-cost industrialized countries is not enough to solve our unemployment problem. We can help solve it in some cases by finding schemes for increasing the mobility of labor, but in the main, it is a problem to be solved by education and training -- by seeing to it that everyone coming into the labor force is prepared to do professional, skilled, or semi-skilled work useful to our society; and by seeing to it that everyone by self education, adult education or vocational education keeps abreast of the rapid rate at which new science, new technologies and new methods are being discovered and applied. Obsolete skills must be replaced by new skills.

Dr. Warner's conclusion that "In the main, it is a problem to be solved by education and training -- by seeing to it that everyone coming into the labor force is prepared to do professional, skilled or semi-skilled work useful to our society"--is very much in keeping with my own philosophy concerning the need for our nation to take steps which will fill what has been and is to a considerable extent at the present time a void in vocational education in this country. Further, I believe that our universities have a responsibility to see that these needs of our society for vocational education and training are met. I am of the opinion that we have gone through somewhat of a cycle with respect to our attitudes concerning vocational education. At the height of World War I when the Smith-Hughes legislation came into being, the United States, as a nation, and at least a limited number of universities, embraced the concept that higher education did have a responsibility for assisting in the preparation of certain members of our society for skilled or semi-skilled employment. I believe it safe to say that this concept was never fully accepted by our American universities and I dare say that even in those institutions offering vocational teacher training, many sectors of the universities concerned were unhappy that they should be, in any way, identified with vocational programs. Criticisms of vocationally oriented university programs, though sporadic, was nonetheless in evidence throughout the decades of the '20s and the '30s. The fact that our universities had failed to provide wholehearted and courageous leadership in training for skilled and semi-skilled employment was pretty well camouflaged by the temporary freedom from world competition which characterized the periods surrounding World War II and the Korean conflict. During the last 10 years, however, with world competition becoming increasingly troublesome, and with our universities doing an ever better job in the areas of "full professional education" it has become increasingly evident that although we have created a society in which the professional man or scholar now occupies an important new position, we have failed to provide adequately with respect to both the needs of and the opportunities for education of skilled and semi-skilled workers.

To a very considerable extent, the technical aid needed in underdeveloped countries is being provided by our universities. It seems ironic that we should have been so keenly aware of our capabilities for developing skills among people of the underdeveloped nations yet remained until recently almost totally insensitive to the growing needs for vocational education in our own country. Fortunately, there are many signs on the horizon that our universities are becoming concerned about assisting in the development of technical training programs. Increasingly, there is evidence that the talents of at least some of our university staff members are being utilized in helping with the organization and establishment of technical endeavors designed to serve the 60 percent of our United States college-age population who will not enroll in institutions of higher education. This awareness on the part of our universities concerning an unsatisfied need of our society has resulted apparently from developments during the last 10 years wherein this nation has experienced a truly alarming increase in unemployment.

At this point I would hasten to make clear that I am not suggesting that vocational training programs for semi-skilled and skilled technical workers should necessarily be set up within our universities. Nor am I saying that funds appropriated to the universities should be allocated for these tasks. Neither am I saying that it is either possible or desirable for university staff members to attempt to utilize their talents for teaching both those students who will become semi-skilled and skilled technical people as well as those who are destined for baccalaureate degrees. What I am saying is that our universities must accept a sizable share of the responsibility for giving leadership which will result in the establishment of institutions which will meet the needs of our society for semi-skilled and skilled technical workers. Further, our universities must share the responsibility for insuring that programs of instruction in both newly established as well as ongoing technical training programs are well-designed and provide for something beyond the purely "how-to-do-it" aspects of education. It would seem to me that the several disciplines most likely to be called on for help face a most interesting challenge in this respect in that concepts and skills for teaching university students, most of whom possess at least some background for such studies, will almost certainly have to be dramatically altered before the teachers in technical training programs can develop meaningful courses for the large group of students who must be educated in vocational and technical schools.

Over the past two or three years, we have worked very closely with members of the Ohio Department of Education and especially with Dr. Byrl R. Shoemaker, Director of Vocational Education, and Mr. Warren G. Weiler, Supervisor for Vocational Agriculture. We have attempted to bring to our discussions with all of these folks a point of view to the effect that we are in contact with the total agricultural industry of Ohio and insofar as the needs of the various segments of that industry have been reflected to us, we want to share that information with the various staff members charged with the responsibility for the various programs of vocational education in Ohio. In setting up the technical training program over at Springfield, Warren Weiler and his staff involved quite a number of our College of Agriculture and Home Economics personnel in discussions relative to all aspects of the curriculum. We have not yet added any courses to our offerings in the Department of Agricultural Education which would have direct application to the preparation of teachers for this type of technical training program. We would certainly be willing to do this if it seems desirable to move in this direction and would be willing to try to work out courses for the pre-service education of undergraduates as well as for in-service training of those teachers already in the field who might wish to move in the direction of teaching in one or another technical training program.

In still another area, we have been working closely with Mr. Weiler and his staff relative to the amount and kind of training in mechanics that should be offered both to our undergraduate students preparing to teach vocational agriculture as well as to the teachers who will be working in the technical training programs in agriculture. More recently, our committee on food technology programs has been meeting with Mr. Weiler and his staff to determine the amount and kind of training needed by students enrolled in technical training programs prior to entry upon jobs involved in one of the 3200 business firms in Ohio that are processing agricultural products.

I am sure that all of you in your respective states have moved forward much the same as we have here in Ohio relative to establishing effective relationships between both the ongoing and developing agricultural technician training programs. I am sure that there is no one best way of developing these relationships but I am convinced that they must be developed and that we in the universities must play a significant role in the organization and establishment of technical training programs that will serve the 60 percent of our United States college-age population who will not enroll in our institutions of higher learning. The kind of world in which we live demands that we all get our shoulders to the wheel on this enormous task. It is a very big job but we can whittle it down to size if we will work together. We in the College of Agriculture and Home Economics here at Ohio State have found that it is a very great challenge to assist as best we can in these endeavors. We do like the opportunity of helping and we look forward to the privilege of being called upon increasingly for whatever assistance we can provide and for such mutual efforts as I believe we must expend if we are to be truly responsive to the needs of our society. Certainly, that is the mission of our land-grant institutions. If we don't have that kind of response in our type of institution, then I don't believe it can be anticipated as coming from anywhere else in the entire complex of higher educational institutions in this country. Actually, I believe that the approach which involves not only the land-grant universities but the business and industry representatives as well, working hand-in-hand with our vocational education staff members, is the best, if not the only, logical way in which to tackle the big job which lies ahead. I personally feel that it is a very great privilege for our universities to be called upon to bring knowledge from the very forefront of research and development to not only our university classrooms and laboratories but in such a manner and in such forms as it may have application to the training of technicians. This is certainly a mission of our College of Agriculture and Home Economics here at The Ohio State University as I see it and we are pleased to have been given this opportunity to express that point of view to you folks assembled here for this National Seminar.

Thank you.

SEMINAR SYNTHESIS AND SUMMARY

by
Robert M. Knoebel
Director, Technical Education Branch
U. S. Office of Education
and
Jerry J. Halterman
Instructor, Agricultural Engineering
Modesto Junior College
California

Presentation by Dr. Knoebel

Needs

I think it has been very evident as we come to a close of the seminar that there is a feeling of definite need for agricultural technology programs. This has been evident as a result of the presentations we have had from the various persons. We think particularly of the presentation of Mr. Merritt D. Hill, Wednesday noon. We think of the report we have from Dr. Phipps. We think of statements regarding demands for graduates from people who have been operating agricultural technology programs for some time. All of these, I think, are indicative of a need throughout the country for this type of program.

I feel that we can go back with a definite understanding that there is a need for certain types of agricultural technology programs throughout the country. What do we do when we get back to our various assignments? Do we just wait for someone else to do something? We should be inspired and challenged to exert every effort to assist with the development of agricultural technology programs. As we return to our States, our responsibilities and our role will probably differ. Surely we will need to check within our own States to determine what the specific needs may be and this isn't easily done. As you work with advisory committees and representatives of appropriate agencies, societies, institutions and organizations you will be able to get some very definite guide lines as to what the specific needs may be in your locality. It appears, too, that you may need to conduct some studies, or to carefully review other studies that have been completed. We have heard emphasized the need for studies of various kinds. There are studies that have been made in other States that may be very helpful, but for psychological reasons, it may be necessary to make certain studies within our States. At the same time, all of us recognize there are certain limitations to studies and that we cannot depend solely upon this source as an indicator by which we should direct our efforts.

Then, too, there is the employment service that has been mentioned a number of times during the sessions. We need to make full use of their services upon our return and this isn't true only for the technical education program but it is true for all of our vocational type programs, too. It is important for us to keep the vocational and technical education offerings in line with employment opportunities. Our cooperation with the employment service will assist in keeping our programs in tune with the demands of the labor market.

Likewise, much help can be obtained by visiting programs that are on-going and that have been very successful. This is one of the ways of helping to determine the needs and also to determine the details of how these needs can be met. We would encourage all of you who possibly can to visit on-going programs as part of your effort to meet the needs within your locality.

It is appropriate to again urge you to work closely with representatives of societies, associations, institutions, and agencies. They can help you. Use their services.

State supervisors need to think of what can be done to provide seminars comparable to this one, on a State level. This is your responsibility. Such seminars can be a real means of helping to impress upon your people the significance of agricultural technology. Teacher educators have a real responsibility when returning to their institutions to provide programs that will recognize agricultural technology needs and will incorporate within the in-service and pre-service program information as to how needs are determined; what the needs may be; the activities that should be carried on by people at the local level or at the "firing line"; and organize programs that will assure the development of the knowledge and skills essential for personnel engaged in agricultural technology to provide quality programs.

Something else was mentioned that should be re-emphasized. Each of you can have a part in developing within your state a master plan for meeting the total state needs. Certainly you can get into great difficulty if you fail to look at the total state situation. Wasteful duplication and inefficiency is likely to result. It is important to look beyond state borders. A neighboring state may be doing an outstanding job in meeting certain needs in agricultural technology. It would be foolish to try to duplicate the same program within your state if needs are already being met by a school or schools in another state. So we need to look not only to our state but need to think of what is being done nationally.

We have talked at some length during the week regarding the preparatory 2-year post-secondary technical education program. It should be mentioned that we should not confine our efforts to preparatory curriculums. There is a tremendous need in the area of updating and upgrading people who are already employed. You may call them short-unit programs or courses. We have only scratched the surface in meeting the needs for such extension or supplementary courses. We have found this to be true in the industrial technical education programs under Title VIII of NDEA.

Actually, under the National Defense Education Act, about 50% more people participated in the so-called upgrading or updating courses than participated in the preparatory curriculums. This is a real service that is needed in the work-a-day world today and the need will continue to grow.

I am sure there are many people in your State who need and would profit by pursuing technical agricultural courses for upgrading and updating. You should not neglect meeting the need. Furthermore, it is representative of a significant effort that really encourages the cooperative spirit we like to have with employers and workers.

Staff

It would seem appropriate to make a comment regarding the reports of the various study groups. It seems to me that we have a wealth of material that has been prepared and presented in the reports. Actually they are a rather good summary. Also, they are almost an order as to what should be done when you get back to your State.

How to adequately meet the staffing demands. Dr. Arnold has spoken of this problem. We have referred to it time and again throughout the week. If there is a No. 1 problem, it seems to me that this is it. The staffing problem isn't limited to the State level or to supervisory, administrative functions. Certainly the agricultural technology teacher supply is going to be one of the crucial problems. We should recognize there are some things we need to do when we get back to our State to help solve the problem of qualified staff.

We should encourage maximum flexibility in those sections of the State plan relating to qualifications, certification, travel, sabbatical leave, internship, pre-service and in-service professional training programs for all technical education staff members, State and local. Don't fence yourself in with a State plan requirement that prohibits you from moving in as many directions as necessary to obtain qualified staff members. You still have an opportunity to do something about this. Don't neglect it.

Let me give you an illustration. When we were reviewing the instrumentation curriculum guide recently, one of the representatives of industry who was a member of the review group, raised a question as to where one could obtain a teacher for the curriculum. Of course, we admit it isn't an easy job. Likewise, it isn't going to be easy to get teachers for some of the agricultural programs that we have been talking about. We reversed the question and asked what industry could do to assist with the teacher problem. It was further indicated that we believed industry should assist with the recruitment, preparation, and updating of technical teachers.

This led us to the matter of internship. It was suggested that industry could assist with the upgrading and updating of technical teachers. Certainly this is going to be a major need in the agricultural technology program. Reference was made to a teacher education program that is underway in one of the States where they are establishing 3-month internship programs. The representative from industry said three months was too short -- he indicated the internship should be at least one year in length in order to be of maximum value to the teacher and of some value to the industry.

If you would expect to provide such experience for in-service teachers, you will need to have flexibility in your State plan and in your teacher employment procedures so you can assist teachers who may need and can profit from this sort of experience. The assistance may be through sabbatical leave; it may be some other type of leave; it may be for full or partial salary; or some other appropriate arrangement. I repeat, don't fence yourself in with your State plan, regulations or policies that prevent you from moving in the direction needed to provide well qualified teachers and other personnel. It is much easier to provide the flexibility needed as the State plan is being written rather than to amend the plan later.

You should think of plans for recruiting essential State and local personnel. Seek out potential leaders in the ranks today and prepare them for leadership and greater responsibility. People who appear to have potential as teachers, administrators, supervisors, or researchers -- let's look for them. They are urgently needed now and will continue to be urgently needed in the foreseeable future.

Another suggestion, encourage 12-month contracts for your teachers, if you do not already have that arrangement. This provides some of the flexibility that you need to have for these people to get essential experiences necessary for updating and upgrading in a rapidly changing technological climate.

Finance

Indirectly, and to some extent directly, suggestions have been made regarding procedures for financing technical programs of education. Mr. Foote made some excellent suggestions regarding means for obtaining certain items for use in programs. Various references to tuition charges have been made by other speakers.

A review of the report of the finance study group reveals that there are many plans in use for financing programs. All sorts of combinations of Federal, State, and local funds are being used to meet the financial needs of successful programs. In addition to the financing procedures already mentioned, gifts and grants may have a part in the program.

What should be your action regarding finances upon your return? If your State has already provided essential finances, you have few worries. Otherwise, you should carefully study your State needs and investigate the procedures used successfully in States most nearly paralleling conditions in your State. Then exercise all of your energy and initiative in helping to provide the necessary finances.

A Few General Comments

The spirit of the seminar has been excellent. Problems have been identified and priorities have been established. The group reports are significant.

Upon your return to your State, make a thorough study of needs, clearly identify areas to be served and develop high quality programs to meet the needs. Carefully title curriculums so that the technologies may be clearly identified -- do not splinter and fragment curriculums.

There are two remarks I would like to make in closing. The first one -- if you have any objection to the U. S. Office of Education actively engaging in or helping to develop materials for agricultural technology, please let us know. Otherwise, we will assume that you are in favor of our efforts to provide suggested curriculum guides and other materials in the field of agricultural technology.

The other comment is personal. As a representative of the Vocational and Technical Education Division of the U. S. Office of Education, I certainly want to say thanks to Dr. Taylor, Jerry Halterman, and their associates for inviting me to participate in this seminar. Certainly, it has been a wonderful opportunity for me to learn from you. I am certain that I have gained much more than I have been able to share with you in return. It should be emphasized that a major objective of the Division of Vocational and Technical Education staff is to furnish any service that may be of assistance to the States in developing quality programs in agricultural technology and if we can be of any service, we hope that you will call upon us.

Best wishes for outstanding success in your efforts to develop agricultural technology programs.

Presentation by Mr. Halterman

We have been concerned these past four days with various facets of technical education in the field of agriculture. This has been done according to plan. But now, at the outset in my summary proceedings, I would like to take the liberty to suggest that we should review, at least in passing, the backdrop of our educational heritage on the American scene. For this review, I have gone back to a national conference on technical education which was held in Washington, D. C., in 1957. I deem it appropriate to consider the following:

> We must realize that beyond technology are significant factors that have made the United States great--far reaching principles that have made us the kind of Nation we are:
>
> 1. The Judaeo-Christian concept of spiritual beliefs and practices.
>
> 2. Our free enterprise system, with its strengths and its faults.
>
> 3. The Bill of Rights granting freedom as individuals in our complex modern society.
>
> 4. Local autonomy, with its fundamental recognition of local rights and local control.
>
> Our free system of public education has been built and lives by these principles, and if America has contributed to the culture of the world, it is because our public schools give meaning and purpose to these precepts.

General Areas of Concern

As review is made of the seminar proceedings, four main areas of concern come to mind. These may be posed in as many questions. (1) Who was involved in the seminar? (2) What was our interest in meeting? (3) What was accomplished? (4) What should be done now?

Let's take a quick look at who was here and what the assemblage was. Recap of the list of seminar participants shows that some 31 persons in supervisory positions, 29 persons in teacher education, 32 institutional representatives, and 14 consultants from all parts of the nation have been gathered here during the past few days to share an interest and concern with each other over developments in the area of technical education in agriculture. Representatives of the United States Office of Education, state vocational education directors, national leaders of industry and education have been called upon to indicate and relate to us pertinent information regarding the technical manpower force in agriculture.

Next, what was attempted at the seminar? What was our interest in joining together at this time? The primary purpose of the seminar was to assist agricultural education leaders in identifying and clarifying their leadership role in the initiation, conduct, and evaluation of agricultural technician programs in their respective states.

A number of specific areas were identified for seminar discussion and detailed examination to aid state leaders in providing effective assistance to agricultural technician programs. We may say, then, the central purpose of this seminar effort was one associated with providing leadership for technical education programs in agriculture.

I'm sure it can be said with little fear of contradiction that the tremendous effort to assemble some of the nation's best consultative staff members available in technical education in agriculture was highly successful and that the more than twenty hours of formal presentation and seven to eight hours of task force group work have proven a rich and satisfying experience for all.

How well did we do? What was accomplished? Five days of working together, with sessions each day, task force group conferences regularly convened, informal discussions between groups and individuals, review and study of materials available, and consultations with resource persons and Office of Education personnel have indeed been a most ambitious conference endeavor. A summary of the events of such a strenuous schedule might be anti-climatic to an average conferee. But you have not been and are not a group of average conferees. From the outset there has been evidence of a great interest and enthusiasm; of renewed vision and determination; of professional dedication to the tasks which rest on vocational educators in helping meet out manpower needs for agricultural technicians.

My observation is that we have done well here at Columbus -- my faith is that we shall do well back home, if we accept the mantle of leadership which has been entrusted to our hands and if we will move out and labor willingly and move ahead courageously with creativity and imagination in meeting what has been pointed out to us as "a bright future not entirely without obstacles".

A number of accomplishments appear to have been realized at the seminar:

1. A concensus was reached concerning major points regarding technical education.
2. Study and review were given to major aspects of technical education programs, the preparation of technicians, and the role of the technician in the agricultural manpower force.
3. A concensus was obtained concerning a working definition of an agricultural technician.
4. The major areas of concern, problems and issues, and trends of technical education were identified and discussed.
5. Identification was made of certain areas of common agreement in technical education.
6. Review was made of efforts being made in technical education in agriculture in various parts of the nation.
7. Stimulus was received for the further development of technical education in agriculture.
8. As a group, we have become sensitized to some of the tasks that are ahead in technical education in agriculture.
9. The forces which brought about the need for technical workers in agriculture have been examined carefully. Some understanding of the need to plug the educational gap between high school and college and university level work has been realized.
10. Relationships have been improved among the various agencies responsible for vocational, technical, and professional education in agriculture as well as between vocational agriculture and the other vocational services.

Broad General Characteristics of Technical Education

A number of characteristics common to technical education as they have been discussed here in the seminar are as follows:

1. It is technical level in contrast to skilled trade and professional levels.
2. Emphasis is upon technical and cognitive skill in contrast to manipulative skill.
3. Emphasis is upon skill and ability to make practical applications of theoretical knowledge in performing specific tasks in a specialized field.
4. Emphasis is upon occupational competency.
5. Analysis is made of occupations to determine curriculum content.
6. Technical education characteristically is:
    a. Terminal in nature.
    b. Less than baccalaureate degree level.
    c. A full time program.
    d. Post high school
    e. Specific preparation for employment.
7. Proper balance among general education, technical education, and related education subjects is maintained.
8. Preparation is made for occupational proficiency in families or clusters of jobs.
9. Technically qualified teachers with field experience are required.
10. The technician is distinguished by his distinctive abilities, his competence in performing his work, and by his specialized training.

Problems Ahead

Time limitations in the task force groups restricted our study of the problems, issues, and trends of technical education in agriculture to a few of the most apparent ones. I think we realize that we have examined rather superficially many of the areas that bear importantly upon technical education, such as accreditation and licensing. No doubt, one of the most striking attributes of the seminar has to be the professional manner in which the participants came to grips with the task at hand. The amount of agreement and concensus which was evident concerning the areas which were discussed reflects the interest and devotion of dedicated leaders. Hopefully, a base of sufficient breadth has been developed to enable each member of the seminar to provide forceful and effective leadership upon his return to his particular assignment.

A number of areas, problems, issues, and trends associated with technical education in agriculture remain for each state staff to study and examine carefully as they plan to move ahead in their field. Some of these have been considered briefly here this week. Without attempting to suggest any degree of importance or rank order, the following items appear especially significant:

1. Attainment of technical level education.

    With the probability that many programs will be developed and established utilizing facilities, equipment, and manpower resources which have long been associated with high school vocational agriculture programs, it appears that one of the most critical concerns would be how we can assure that technical level education will be realized. I think, too, that this concern should be held by those who have had post-high school programs. Would it not be a serious mistake to presume or give the impression that our present post-high school two-year programs are predominantly technical level? The place of standards and accreditation in technical education in agriculture is of utmost importance and will require additional study.

2. Nomenclature

   Specialization within the field of agriculture and occupations related to it has brought about the need to identify and study the various occupational endeavors engaged in by workers in these fields. Heretofore, these occupations have most often been classified simply as agricultural. We, in agriculture, are faced with the necessity of analyzing titles and of writing descriptions for occupational positions for the entire agricultural complex. This will require classification guides for workers at all levels on the level-of-preparation continuum. The use of standards also presumes the adoption of a characteristic nomenclature common to the field.

3. Status

   The problem of achieving status and prestige both by vocational and technical education programs and by students enrolled in these programs continues to be serious and poses one of the most consequential issues in the field of education. It appears that the ultimate success of technical education depends upon the attainment realized in having the proper educational role accorded to it by the public, industry, and other levels of education. Some progress has been made. A great deal more is needed.

4. The involvement of the federal government in technical education

   The federal government has been involved in vocational education in agriculture for many years. As the national program of defense, area redevelopment, manpower training, and poverty are further implemented, greater involvement of government into education will be seen. The Department of Labor and associated employment offices have been assigned important roles in moving these programs ahead in cooperation with the Department of Health, Education, and Welfare. It can be expected that state and local technical education programs in agriculture will be affected by the role of government in these educational endeavors.

5. The role of the high school in technical education in agriculture

   The part which high school vocational agriculture programs should have in technical education is not well known. Admittedly, most of the prospective students will come from these secondary schools, but little has been done to study what should be attempted to support post-high school technical education. It can be reasoned that some pre-technical preparation should be attempted in the high schools.

6. The role of industry in technical education

   Inherent in the task of vocational-technical education in agriculture is the involvement of persons who direct the efforts of agricultural production and related industries. The extent of this involvement appears to be the critical concern. One of the perplexing problems in this area has to do with the most efficient use of human resources. What can be done by both industry and education to bring about a more effective deployment and utilization of resources in order that personnel will be employed in occupational endeavors more nearly fitting to their training and preparation? This is particularly relevant to professional and technical workers. Another problem in this area has to do with the most effective involvement of industry in cooperative work programs both in terms of the use of facilities and equipment and in the use of personnel of the firm in order to realize optimum educational returns.

What now? What course of action is to be taken?

Regardless of our position and regardless of whether or not we are supervisory, teacher education, or institutional representative personnel, as leaders in agricultural education it is now incumbent upon each of us to carry the spirit of this seminar to our colleagues and subordinates and see to it that a program of action results. In determining how best to adapt the material of this study session to various local settings, consider the following general guidelines as they apply to master planning for both short and long range planning.

1. Establish priorities - dare to put first things first.
2. Clarify relationships - place all things in proper perspective.
3. Allocate resources - don't try to do a man's job with a child's toy.
4. Spell out and define roles of persons, groups, agencies and institutions - a house of order is a house of strength.
5. Articulate efforts with others - many roads lead to Rome; we don't need to travel them all.
6. Correlate techniques and procedures to the total educational program - no man (or program) should be an island unto himself (itself).

Leadership

As we plan ahead, we should be cognizant of the changes which have recently come about in society, in education, and in agriculture. We should study the forces which have brought these changes about, recognizing that most of these pressures will continue to be operative and if they are properly understood, manipulation can be made of many of them that will help bring about desired change.

As we are concerned with curricula development for technical education programs in agriculture and related occupations, it is well to draw upon valid occupational, educational, and interest surveys conducted in the appropriate local setting. Advisory committees of lay membership should be used in making surveys and in determining types of curricula to offer. Technical curricula are occupation centered and planned toward occupational competence. Preparation should be made for clusters of related technical occupations. A balance between technical supporting content and class-laboratory experiences is essential for learning concepts and principles and their application. The curriculum should be flexible enough to be easily revised as needed in advance of changing competence of the technician. Let us keep foremost in our minds that the task of education is for professionally qualified personnel and that while we as educators must work cooperatively with others who have an interest in the product of educational programs, the ultimate responsibility for the program lies with the profession.

One of the major objectives of this National Center is the development of leadership in the field of agricultural education. Certainly the one major strand which has been interwoven throughout the proceedings of this seminar has been the challenge to our leadership potential to move ahead in our sphere of responsibility. As we give direction and stimulus to program planning, research and development, establishment and maintenance of programs in technical education in agriculture, it is well to reflect upon the preachments of this seminar concerning leadership:

1. True leadership will not allow operational involvement.
2. The leadership position which each of us possesses has a functional aspect because through exercising the role behavior inherent in this position, identity is made of the significance of the role of agricultural education in our nation.
3. The leadership position each of us possesses has a symbolical aspect because through exercising the role behavior inherent in this position, meaning is given agricultural education by the manner and by the spirit in which our task is performed.
4. Leadership begets leadership in an upward spiral.
5. The cycle of success in leadership development programs inevitably leads to the destruction of the finest product - "leadership" - if the ruinous forces which lead to this destruction are not recognized and treated accordingly. Some of these forces are complacency, indifference, callousness, self-seeking pride, vain ambition, blindness and indolence.

6. If we are not the kind of a leader we would be, we can find encouragement in the realization that many important traits of leadership are developmental.

7. Educational leaders will be required to work cooperatively with leaders of industry in the development of educational programs to prepare the kind of technical worker needed by industry.

In summary, Dr. Taylor indicated at the beginning of this study period that we had the factors of success for the seminar at hand--we had a task, well definied; a concern; experience to draw on; a staff of consultants; a favorable climate and an appropriate setting. As these factors have been amalgamated and emulsified, I'm sure you will agree with me, the product has been a most satisfying, productive, and stimulating professional experience.

It is appropriate to conclude this seminar activity with the remarks of President Johnson upon signing the National Vocational Education Act of 1963 --

> Education is the key to our social and economic and technological and moral progress....Modern demands upon labor and industry require new skills and an upgrading of old skills, require more education and greater knowledge....Education is the cornerstone of our freedom.

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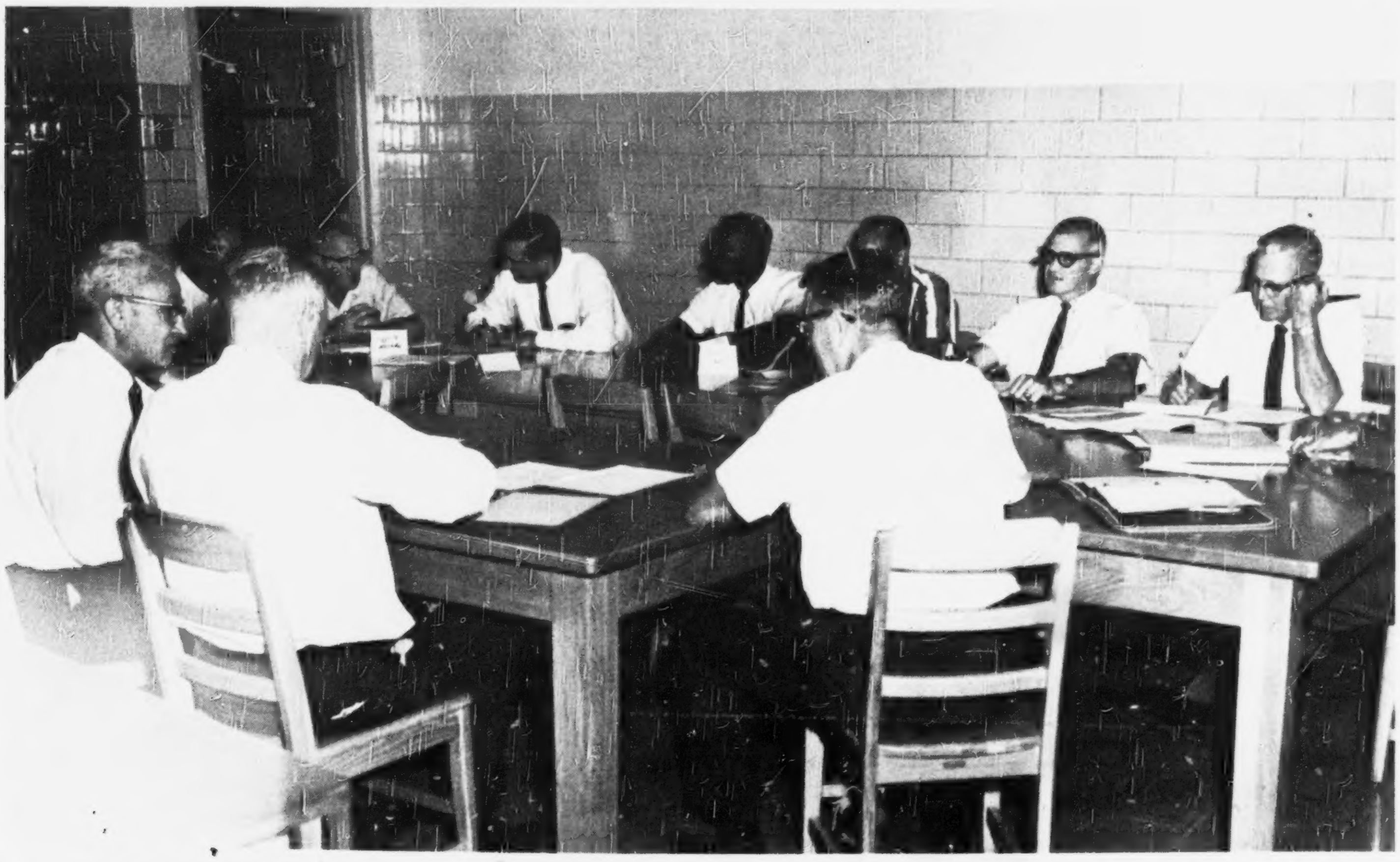
Mr. Greenleaf

Developing effective relationships between agricultural technician programs and other agencies, organizations, and institutions was one of the vital topics discussed by this panel moderated by Dean Roy M. Kottman, of the College of Agriculture and Home Economics, The Ohio State University (second from left). Other panel members (left to right) include LaVern R. Freeh, Head, Department of Short Courses, University of Minnesota; Robert M. Knoebel, Director, Technical Education Branch, U. S. Office of Education; and George Greenleaf, Executive Vice President, Grain and Feed Dealers Association of Ohio.



Much of the value of the seminar was derived from participation in task force discussion and activities. This task force subgroup is shown working with Dr. Robert M. Knoebel, Director, Technical Education Branch, U. S. Office of Education, Seminar Consultant, on problems in financing agricultural technician programs.

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PART III

TASK FORCE REPORTS

Editor's Note: In presenting these task force reports, the following points are set forth for the reader's consideration:

1. Time limitations precluded the development of complete studies by each task force group.

2. No attempt was made to order in importance the areas of concern, problems and issues, or trends in terms of their importance to technical education in agriculture. All are important to some extent but resource and time limitations restricted the amount of treatment possible.

3. Material contained in these reports should not be construed to be policy of the National Center or of the seminar itself. The reports were accepted by consensus and their content is not binding on any person, agency, or institution.

4. Because of the diversity of the administrative framework within which technical education can be pursued, each state needs to identify priorities for further study.

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TASK FORCE NO. 1

DETERMINING NEEDS FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

Chairman: John W. Lacey, Kansas
Consultant: Lloyd J. Phipps, Illinois
Recorder: Kenneth K. Mitchell, Tennessee

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James E. Christiansen, Arizona
Avery Gray, Indiana
G. R. Cochran, Minnesota
Robert Hayward, Missouri
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Howard Christensen, Nevada
Charles W. Hill, New York
W. H. Moore, North Carolina
J. W. Warren, Jr., North Carolina
Robert A. Hodges, Oklahoma
Fred C. Snyder, Pennsylvania
W. R. Carter, South Carolina
Floyd Johnson, South Carolina
Earl H. Knebel, Texas

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TASK FORCE NO. 1

DETERMINING NEEDS FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

I. Possible Areas of Consideration by the Task Force

- Surveys and studies
- Data gathering
- Sources of data
- Other methods to determine need
- Advisory committee use
- Demands for technicians
- Geographic location
- Data and information needed
- Correlation
- Articulation
- Consultants
- Time and financial budgets for making surveys
- Analysis of survey findings

II. Problems and Issues

A. Should there be a statewide master plan for technical education?

B. What kind of occupational surveys are to be used to determine needs?

C. What are the educational needs of agricultural technicians?

D. Where are agricultural technicians needed?

E. What is the geographical need for technical programs in agriculture?

F. What have previous studies shown to be the educational needs of technical workers in agriculture?

G. What should state and local educational leaders (administrative, supervisory, instructional personnel) do to determine the needs for agricultural technician programs?

H. Who, in addition to educational leaders, should be involved in studying the need for technician training programs?

I. What research is being done to establish patterns and procedures that will be of assistance to educational leaders in identifying needs for agricultural technician training programs?

J. What resources are currently available for use in determining technician needs?

K. What are the major problems encountered in the development, establishment, and maintenance of technical training programs that might be clarified in a survey?

L. How can persons in agriculture and industry work with educational leaders in order that highly qualified personnel may be most profitably utilized in the task facing both groups of identifying and satisfying technical education needs?

M. ?

III. Trends

A. Adult education (post-high, pre-service, and in-service) is being accepted by more and more people as a public responsibility.

B. A closer integration with industry is being realized.

C. There is an increased demand for technicians.

D. The increased need for technicians is spreading geographically, occupationally, and institutionally.

E. Generally speaking, the supply of trained technicians is not meeting the demand.

F. Pre-service education will remain important but the biggest development is toward in-service programs.

G. Efforts are being made to locate post-high school educational centers in places readily accessible to most residents of the state.

H. Most states are conducting one or more studies to determine needs for technical education programs in agriculture.

I. ?

IV. Study of a Selected Problem by the Task Force Group

A. The Problem

Any program which utilizes public funds and which has a continuing effect upon the present and future of an individual must be built upon a firm and broad foundation. This is especially true of a program designed to prepare individuals for a vocation.

This foundation must be built on facts, not assumptions. One of the major problems faced by an administrator who is considering the establishment of a technical education program is to secure the facts necessary to make sound and defensible judgments.

This report is designed to guide individuals who are searching for facts and at the same time develop rapport, assistance, and understandings from many individuals, organizations, and businesses related to agricultural technician programs.

B. Possible Courses of Action

In order to initiate successful plans for determining needs for developing agricultural technician education programs, it is assumed that state and local administrators, vocational education supervisory personnel, teacher educators, vocational teachers, guidance counselors, lay citizens, and those concerned with agricultural industries and businesses must be genuinely interested in thoroughly exploring the possibilities for developing technician training programs. All identified above must be involved in this process in order to successfully determine needs and, also, to gain enthusiastic support of programs that may develop.

Each state has a different organizational structure and setting, which dictate the order of procedures as well as the depth of study. The steps outlined in this report are, therefore, not necessarily in the order in which they need to be performed. Some steps may also have been omitted.

Steps to Follow in Determining Needs	How to Accomplish These Steps
1. Review existing data.	1. Both state and local groups review data. Contact employment service.
2. Conduct occupational surveys. a. State level b. Local level	2. Contact employment service. Contact state department of agriculture. Contact state sales tax department to identify agricultural businesses. Contact economic development commissions. Check telephone directories.
3. Solicit support and involve state or local agriculturally oriented associations, businesses, and industrial concerns.	3. Determine occupations for which agricultural education is required or desired. Determine the level of training needed for specific occupational "families". Determine rate of turnover. Determine future needs. Determine what training is the responsibility of industry and education. Determine whether the program is needed for retraining, upgrading, or entry training. Determine salary schedule. Determine agricultural knowledge and skills needed by the job and by the instructor. Determine the opportunities for on-the-job training. Determine legal implications.
4. Solicit support of and involve professional agricultural people.	4. Determine job opportunities. Determine staff needs. Determine course content and training requirement needs. Help in recruitment and placement.
5. Organize and work with state and local advisory committees.	5. Advise in formulating philosophy and policy.
6. Analyze existing data.	6. Determine extent and success of existing programs.
7. Study geographical location of students and their interests.	7. Utilize local, county, and area surveys to determine job opportunities of potential enrollees.
8. Study the occupational interests and agricultural education needs of students.	8. Involve parents, guidance counselors, high school principals, vocational agriculture teachers, and students.
9. Determine the curriculum and the number of centers in which each is offered.	9. Evaluate preceding steps. a. Determine job clusters and curriculum. b. Determine level of training needed. c. Determine how many students (by areas) are interested in the curriculum offered.
10. Conduct pilot programs.	10. Determine location, curriculum, students, facilities, organization, and operation of the pilot program. Maintain continuous evaluation by all concerned, including students.

Steps to Follow in Determining Needs	How to Accomplish These Steps
11. Develop state master plan for technical education and continuous system of evaluation.	11. Analyze preceding data, identify principles, develop a philosophy, plan an action program. Develop an action program in agricultural education that meets the occupational training needs of all levels below the baccalaureate degree. Coordinate the plan for agricultural technical education with other agricultural education programs.

TASK FORCE NO. 2

CURRICULAR CONSIDERATIONS FOR AGRICULTURAL TECHNICIAN TRAINING

Chairman: C. G. Dawson, North Carolina
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C. E. Richard, Virginia
Robert V. Kerwood, West Virginia

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TASK FORCE NO. 2

CURRICULAR CONSIDERATIONS FOR AGRICULTURAL TECHNICIAN TRAINING

I. Possible Areas of Consideration by the Task Force

- Orientation
- Agricultural and industrial correlation
  - Job analysis
  - Job requirements
- Content, balance between general and technical education (core elements)
- Accreditation
- Licensing
- Certification
- Diplomas
- Credentials
- Cooperative education
- Occupational experiences
- Occupational classifications
- Research and evaluation
- Teaching materials
- Instructional aids and devices
- Pre-service technical education
- Upgrading of employed technicians

II. Problems and Issues

A. How can high quality instructional programs be established and maintained at the technical level?

B. Should technician curricular offerings be broadened?

C. Are standardized technical curricula desirable?

D. What research is needed to guide the expansion and improvement of agricultural technician programs?

E. Are pre-service technical and upgrading programs for technicians compatible in the same institution?

F. How can occupational experience programs become integral, effective, and supportive to the formal education effort?

G. What influence should existing technology programs have on the development and establishment of new ones?

H. Typically, what technical curricula have been offered?

I. Are there cores of knowledge and skill common to various kinds of technician programs?

J. What balance between general and special education should there be in the technicians' curriculum?

K. What can be done to relate special education to specific job requirements?

L. What effort should be made to attempt transfer of credits from technical schools to four-year colleges and universities?

M. Should agricultural technician training programs be structured as "field" oriented or as "job" oriented?

N. What arrangements are needed with cooperating agencies and firms to assure an effective educational experience is obtained in work experience programs?

O. What procedures and regulations of accreditation, licensing, and certification are needed to assure adherence to minimum acceptable standards of technical education and to protect graduates of bona fide programs?

P. ?

III. Trends

A. A standardization of level of post-high-school level work--neither trade nor professional.

B. The amount and quality of general education in the technical curricula are increasing.

C. Accreditation and licensing procedures will serve to assure adherence to acceptable standards by technical training institutions.

D. There is a trend to standardize curricula.

E. State and local surveys of employers are being made as the basis for program development.

F. The range of offerings in the technical education field is increasing to include many new areas.

G. The number of pre-employment programs is increasing markedly.

H. Accreditation by national bodies is expanding slowly; certificates are being issued for completion.

I. The Associate of Arts degree is gradually becoming recognized as the technical certificate.

J. Certification or licensing of technicians will expand.

K. ?

IV. Study of Selected Problems by the Task Force Group

A. Problem 1

1. Problem

Develop a guide for establishing a curriculum for agricultural technician training programs. This problem presumes the program to be post-high school, two-year, and at the technical level.

2. Suggested Course of Action

Consider adopting the following broad curriculum content guide:

I. General Education ---------------------------------- 20-30%

A. Communication Skills
B. Social Science, Economics, Human Relations

II. Math and Science ---------------------------------- 10-20%

A. Basic
B. Applied

III. Agriculture Business or Other Auxiliary Services -- 10-20%

A. Marketing
B. Accounting
C. Economics

IV. Technical Agriculture ---------------------------- 30-40%

A. Specialty Areas

V. Electives -------------------------------------- 0-10%

B. Problem 2

1. Problem

Develop a procedure for program planning and course development.

2. Suggested Course of Action

Consider adopting the following outline to guide program curriculum development:

I. Determination of Needs -- Involve lay advisory committee

II. Program Development -- Include administration and staff

A. Curriculum
B. Student Services
C. Finances
D. Staffing
E. Other

III. Course Development and Implementation -- Have instructional staff direct

A. Course Content
B. Instructional Materials
C. Instructional Coordination (internal and external)
D. Evaluation

IV. Follow-up and Program Evaluation

C. Problem 3

1. Problem

Develop a relationship in cooperative education to provide for occupational experiences.

2. Suggested Course of Action

Work (learning) experience is desirable. This experience should be adaptable to the industry. It should be for credit and it should be supervised in cooperation with the employer. Responsibilities, liabilities, and insurance are critical considerations.

D. Problem 4

1. Problem

Should provisions be made for upgrading of employed technicians?

2. Suggested Course of Action

A continuing education service of short, intensive courses for the upgrading of technicians should be included as part of the technician training program.

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TASK FORCE NO. 3

STAFFING AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

Chairman: David R. McClay, Pennsylvania
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Recorder: T. R. Miller, North Carolina

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Charles C. Drawbaugh, New Jersey
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Forrest Perkins, Vermont

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TASK FORCE NO. 3

STAFFING AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

I. Possible Areas of Consideration by the Task Force

Administrative personnel
Supervisory personnel
Instructional personnel
Industrial specialists
Educational consultants
Recruitment
Qualifications
Leadership responsibilities
Teacher education
    Pre-service
    In-service

II. Problems and Issues

A. What technical and professional qualifications are desirable for teachers in technical education programs?

B. What is the leadership role of state staffs in technical education in agriculture?

C. Should teachers be recruited from the agricultural industry and prepared professionally to teach or should teacher trainees attempt to become occupationally competent through on-the-job training in industry?

D. What role should supervisors have in technical education in agriculture?

E. How can teacher education programs prepare and upgrade present vocational teachers for the task of instructing in technical education programs?

F. What staffing patterns and procedures have been used successfully by other technical education areas?

G. What shifts in staffing will be necessary in our present agricultural education programs to provide for effective technical education?

H. Can teacher education programs meet the need for technical instructors, supervisors, and administrators?

I. ?

III. Trends

A. Professional, highly technically qualified men from industry, many with teacher education background, are returning to the classrooms of technical schools on a part-time basis.

B. Technical education staffs are being appointed to direct state efforts in this field.

C. Qualified teachers, supervisors, and administrative personnel are in short supply.

D. Teacher training programs for preparing teachers and supervisors in technical education are being developed.

E. ?

IV. Study of Selected Problems by the Task Force Group

A. Problem 1

1. Problem

What professional and technical qualifications are desirable in technical education programs?

2. Suggested Course of Action

Consider the following suggested standards:

I. General Qualifications

A. Demonstrated competence through experience in the agricultural occupation

B. Interest in the program

C. Desirable physical and personal traits

II. Specific Qualifications

A. Master of Science degree in field of specialization plus one or more years of experience in the field, including _X_ credits of professional education (methods, etc.).

B. Bachelor of Science in Agricultural Education plus Master of Science in specialty field

C. Bachelor of Science in special field plus Master of Science in Agricultural Education or Education

III. Alternate or Equivalent

A. _X_ years of experience or _X_ level of achievement in competency examinations, plus continuous in-service professional and technical (college level or trade equivalent) courses leading to "B" above.

B. Problem 2

1. Problem

Who has the leadership role in technical education in agriculture?

2. Suggested Course of Action

a. All agencies concerned should meet to gain understanding of member role and to coordinate a statewide technical education program.

b. In preparation of revised state plans, all public institutions concerned should be involved.

c. Initiative for developing statewide programs may arise from any interested source; however, such offices as state superintendent of public instruction, state supervisor of agriculture, and teacher education are looked to for initiating leadership action.

C. Problem 3

1. Problem

What local leadership is needed in technical education programs?

2. Suggested Course of Action

Professional staff members in those institutions which have been offering technical agriculture programs for years indicate that it is very important that a staff member be designated as coordinator or division head for each field of specialization and possess the following qualifications:

a. Competence in his field

b. Knowledge of the industry and with status of agriculture

c. Demonstrated ability in administration, supervision, and human relations

d. Master's degree plus experience in his specialized field.

D. Problem 4

1. Problem

What is the role of the state staff in technical education programs?

2. Suggested Course of Action

Consider the following outline as a guide:

I. State Supervisory Staff Responsibilities

A. See that needs of technical education in agriculture are determined.

B. Analyze and assess the ways in which needs might be met.

C. Stimulate, promote, and assist in the development of the program.

D. See that resources are made available.

E. Coordinate the program with other elements of agricultural education.

F. Conduct continual evaluation (including research).

II. Teacher Education Responsibilities

A. Cooperate with state staff in providing the needed teachers.

B. Provide the opportunity for graduate programs of professional education for those prospective technician teachers who have baccalaureate degrees in a specialized subject matter area.

C. Provide appropriate in-service education for increasing the professional competence of teachers of technician education.

D. Exercise leadership in developing needed research in the area of technician training.

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TASK FORCE NO. 4

FACILITIES AND EQUIPMENT FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

Chairman:	Leno V. Christensen, Oregon
Consultant:	Norman H. Foote, New York
Recorder:	J. R. Hamilton, Missouri

R. C. Haynie, Arkansas
Max H. Kuster, Illinois
Bobbie R. Grogan, Kentucky
A. Mumphrey, Louisiana
Everett Lattimer, New York
F. Hubert Garner, North Carolina
Paul Pulse, Ohio
Clifford M. Painter, Pennsylvania
Vannoy Stewart, Texas
Dale C. Aebischer, Wisconsin

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TASK FORCE NO. 4

FACILITIES AND EQUIPMENT FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

I. Possible Areas of Consideration by the Task Force

Classrooms
Shops
Laboratories
Agricultural production resources
Tools
Machinery
Equipment
Industrial resources

II. Problems and Issues

A. What facilities and equipment are needed for various technical education programs?

B. How do these differ from those used in trade-vocational schools and in professional programs?

C. How can technical schools assure themselves of keeping current and up-to-date in terms of facilities and equipment?

D. How can facilities and equipment be utilized to the greatest extent possible considering the total technical school needs? How can the program be most flexible and adaptable in this regard?

E. Is it feasible for vocational, technical, and pre-professional student groups to use the same facilities and equipment?

F. Are there lists of recommended facilities and equipment available for various technical training programs?

G. What expenditures can be anticipated for various facilities and different equipment necessary for technical training programs?

H. What cooperative arrangements are possible with industry for use of facilities and equipment, especially in periods of low industrial use?

I. ?

III. Trends

A. Educational administrators and planners are recognizing the specialized needs of technical education programs for facilities and equipment.

B. Industrial leaders are accepting a greater share of the educational endeavor and are giving support to technical programs by extending financial assistance, cooperating in work experience programs, serving on advisory committees, and making facilities and equipment available for use.

C. Lease arrangements are being used on equipment for educational purposes.

D. ?

IV. Study of a Selected Problem by the Task Force Group

A. The Problem

How to effectively match the facilities and equipment required with the program of instruction planned or offered so that instruction will be properly supported.

B. Suggested Course of Action

Each state promptly initiate action to establish recommended policies relative to facilities and equipment for the type of program to be offered. Concurrent with the development of policies, each state should develop lists of equipment and set basic standards for facilities.

1. Suggested Guidelines for the Establishment of Basic Policy

   a. In attaining the objectives for training agricultural technicians, facilities and equipment must be of such nature and quantity as to encourage effective implementation of the instructional program which has been designed to develop the desired technical competencies.

   b. Every effort should be expended to secure high quality, necessary equipment and facilities.

   c. Maximum and efficient use should be made of all existing facilities and equipment which are appropriate to technical education.

2. Facilities

   Specific guidelines need to be developed by each state.

   a. Classrooms - Should be of adequate size and number for the program(s)

   b. Laboratories - Sufficient in size and number to serve each subject matter area, such as soil science, horticulture (greenhouse), animal science, etc.

   c. Shops - Agricultural and mechanical

   d. Land laboratory - Adequate for curriculum content; can vary from a few acres to a large farm

   e. Industrial facilities - The possibility of using this type of facility should be explored; examples, food processing (canning, freezing), seed cleaning, meat packing

3. Equipment

   a. The equipment necessary to fully utilize the facilities which are needed for the programs of instruction should be provided.

   b. Equipment should be comparable, insofar as possible, to that used in industry.

   c. All sources of supply for equipment should be thoroughly explored. Some sources are:

      (1) Donations - Gifts from individuals and/or business concerns

      (2) Loans - Specialized equipment which may be borrowed by school for a specified period of time or a specific unit of instruction

(3) Rent or Lease - This may be an especially important source of supply for expensive equipment or equipment which tends to early obsolescence.

(4) Purchase

d. Extreme care should be exercised to avoid overbuying of equipment.

4. Special Considerations

a. Sharing of facilities should be approached with caution. This does not preclude the sharing of facilities, but such sharing should be carefully organized and coordinated at all administrative levels.

b. All facilities should be designed to assure maximum flexibility and adaptability.

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TASK FORCE NO. 5

STUDENT SERVICES FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

Chairman: Daniel E. Koble, Jr., Delaware
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TASK FORCE NO. 5

STUDENT SERVICES FOR AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

I. Possible Areas of Consideration by the Task Force

Recruitment
Selection
Admission
Counseling
Guidance
Remedial services
Extra-curricular activities
Student organizations and other leadership activities
Student records
Library
Resident facilities
Financial aid
Transportation
Placement
Follow-up

II. Problems and Issues

A. How can an effective recruitment program be developed to attract competent students?

B. What criteria are most effective for use in student selection and admission to technical education programs?

C. Should institutions offering technical training serve remedial needs of persons not meeting prerequisite standards?

D. What is the responsibility of the training institution for job placement and follow-up?

E. Should counseling and guidance be the responsibility of the technical staff or should general student service personnel provide this service?

F. How can education assist industry in effectively deploying and utilizing persons who are trained and prepared at various levels of occupational preparation?

G. ?

III. Trends

A. Technical education is realizing larger total enrollments and a larger percentage of all students enrolled in post-high school education.

B. Recruiting continues to be a major problem.

C. The need for selectivity is being recognized in student recruitment.

D. More emphasis is being placed on guidance and counseling.

E. Placement after graduation and follow-up continue to be measures of success of the program.

F. The addition of more and higher quality student services is exhibited as schools grow and additional funds are made available.

G. ?

IV. Study of Selected Problems by the Task Force Group

A. Problem 1

1. Problem

How can an effective recruitment program be developed to attract competent students? Evidence from this seminar would indicate that opportunity exists for agricultural technicians with post-high school training; however, since neither prospective students nor prospective employers always recognize this need, effective recruitment procedures are paramount to the successful initiation of a program.

2. Suggested Courses of Action

a. Develop only programs that are needed, with the services of a carefully selected advisory committee.

b. Publicize the program through established news media.

c. Print brochures of the program, indicating employment opportunities, curriculum, cost to the student, and other pertinent information and then distribute to prospective students, employers, and others who might be in contact with potential enrollees.

d. Make personal contacts with:

(1) Vocational agriculture instructors

(2) Guidance and other school personnel at state and local levels

(3) County agricultural agents

(4) Other interested professional and business people

(5) Prospective students and their parents

(6) Prospective employers, including their trade associations.

e. Appear before:

(1) Civic groups, P.T.A., etc.

(2) High school career day programs

(3) State and local association meetings, such as co-ops, etc.

(4) Any other meeting which might reach potential students.

f. Conduct special events at training institutions, such as open house, career days, etc.

B. Problem 2

1. Problem

For technical programs in agriculture, what devices may be used to complement existing admission tools? In general, educators have utilized standardized tests and academic records for admission and placement. Emphasis has been on the selection of students for four-year college programs. Tests have not been extensively developed to measure aptitudes of students for technical training.

2. Suggested Courses of Action

a. Study effectiveness of devices commonly used for college admissions:

        - (1) Tests, e.g., General Scholastic Aptitude, American College Testing Program, etc.
        - (2) High school academic records.
    - b. Select students who have interest in and aptitudes for specific technical programs, utilizing the following:
        - (1) High school records
        - (2) Recommendations from high school teachers
        - (3) Personal interviews by instructors in selected technical programs
        - (4) Tests that will measure aptitudes needed for success in technical areas of agriculture.

C. Problem 3

1. Problem

There is need for continuous leadership training through a student organization and activity program in institutions offering technical education. This is needed to:

- a. Fulfill a continuing need for organizational activities between high school and entry into adult organizations
- b. Provide organized leadership training outside the classroom
- c. Provide participation experiences in and develop a feeling of responsibility for organizational activities that may be carried on in the community
- d. Supplement the instructional program.

2. Suggested Courses of Action

- a. Develop with the entire school staff an overall program of activities suitable to the institution.
- b. Have members of the staff assume responsibility for advising and counseling student activities. Staff members should assume initiative in developing student leadership for specific activities, including such functions as programming, scheduling, etc.
- c. Build on students' experiences resulting from earlier activities in Scouts, 4-H, FFA, and other organizations.
- d. Correlate activities with the instructional program.
- e. Encourage affiliation with appropriate service clubs or trade associations.
- f. Develop appropriate athletic and recreational activities.
- g. Survey activities being conducted by similar institutions in the area.
- h. Evaluate activities continually to determine their value in the overall program. Use student leaders as a "sounding board" for program changes.
- i. Conduct research to determine organizations and activities being operated successfully throughout the country.

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TASK FORCE NO. 6

FINANCING OF AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

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TASK FORCE NO. 6

FINANCING OF AGRICULTURAL TECHNICIAN TRAINING PROGRAMS

I. Possible Areas of Consideration by the Task Force

Financial support
Budgeting
Accounting
Sources of funds
Cost control
Operating costs
    Salaries
    Supplies
    Instructional materials
Capital outlay
Relative proportion of support
    Federal
    State
    Local
    Student

II. Problems and Issues

A. Who should bear the costs of technician training?

B. What should federal, state, and local participation be in financing technical education programs?

C. Should local school districts bear the financial burden of training out-of-district students or should the area of residence share the cost?

D. Should students bear a considerable part of the expense of post-high school technical education or should it be supported as secondary schools are supported?

E. What is included in the costs of training?

F. What are typical expenditures for various kinds of technical programs and for various phases within a given technical program?

G. What can be done by districts on a reciprocal basis to share the high costs of specialized programs?

H. ?

III. Trends

A. Public support is increasing financially and in the acceptance of technical workers.

B. Costs of technical education continue to rise.

C. The earning power of workers prepared in technical training is increasing proportionately to earnings of other workers.

D. ?

IV. Study of a Selected Problem by the Task Force Group

A. The Problem

The financing of a post-high school technical education program in agriculture has developed amid a diversity of laws and policies within the various states. There has been increased support for technical education in agriculture in several states and on the part of the federal government. In many cases, funds have been made available or will become available in the immediate future. Moreover, the whole educational climate is more receptive to technical education. In substance, then, the problems of financing are matters of organizing or arranging a financial pattern within the structure of the various states.

Proposed legislation gives encouragement to a comprehensive program of technical education. How these funds can be wisely or fairly used to make the program available to all interested youth challenges vocational agriculture leadership. Non-farm employment opportunities are frequently not found in communities where these youth reside. Furthermore, technical schools cannot be established in all communities. Therefore, it is difficult to determine the proper share that the student, the local community, the state, or the federal government should provide.

B. Suggested Courses of Action

1. Examples of procedures followed in each of several states for financing two-year preparatory programs in agricultural technology are as follows:

    a. "Currently, all programs are given at the State University.

    Student fees: $175 in state, $350 out-of-state, per ten-week term

    50% student funds - 50% state funds"

    b. "Approximation of share of total expenses:
    Federal and state -- 65%
    Local -------------- 20%
    Student ------------ 15%

    The general procedure in the past has been for the county (local) to pay for building and land.

    A state appropriation of $187,000 was made available to develop programs in agricultural technology. These programs now exist in ten institutes across the state."

    c. "100% financed from State University funds and $400 student tuition."

    d. "Student fees per year -- $212

    Instructional staff and materials from University budget.

    Coordinators of each program:
    25% of salary and in-state travel from vocational education funds
    75% University budget"

    e. "Financed by the College of Agriculture with state funds and student tuition."

    f. "When initiating or expanding programs:

First Year	-- 100%	Federal funds
Second Year	-- 100%	
Third Year	-- 75%	Balance 50% net maintenance from state and local funds
Fourth Year	-- 50%	
Fifth Year	-- 25%	

For continuing an established program:
50% net maintenance
100% for travel and expenses

All post-secondary programs are free to residents of the state. No tuition charge is made to students except for out-of-district students ($500). In such cases the town of residence is required to pay the entire amount of tuition of which 50% will be reimbursed by the state."

g. "Local property tax ---------------------------------- 75%
State income (based on average daily attendance) --- 25%

No in-state tuition

Out-of-state tuition: $10 per unit; maximum, $150 per student"

h. "State University supported. No vocational funds used."

i. "Operating expenses reimbursed 50% from federal funds, balance from state funds.

Travel reimbursed 50% from federal funds, balance from state funds.

Buildings, facilities, and all other expenses are contributed by the State University.

Student tuition: $380 in-state
$925 out-of-state"

j. "Federal funds: $7,500 per course for equipment
100% of personnel costs until course starts
66 2/3% of instructional costs
75% of travel and subsistence for instructors
100% of subsistence for workshops, etc.

Student fees: $375 within district (approximately one-third of instructional costs)
$407 out-of-district (includes $75 for books and laboratory fees)

Local community furnishes facilities."

2. Suggested patterns for establishment (future):

a. Apply new funds only for post-high school and adult education on the basis of 66 2/3 per cent reimbursement for operation of program as long as funds are available.

b. Finance teacher's salaries as follows:

	Federal Funds	State Funds	Local Funds
First Year ---	100%	-----	-----
Second Year ---	100%	-----	-----
Third Year ---	75%	12.5%	12.5%
Fourth Year ---	50%	25.0%	25.0%
Fifth Year ---	25%	37.5%	37.5%

Travel and expenses:
50% from federal and state funds
50% from local funds

c. 75% of operational costs from state and federal funds except for non-technical teachers
$ 7 per semester hour for each student, reimbursed from state funds
$90 tuition per year

3. Funds under the Vocational Education Act of 1963 (P.L. 88-210)

   a. Construction

      The Vocational Education Act of 1963 authorizes federal funds for vocational and technical education, which may be used for the construction of new buildings, including initial equipment and expansion, remodeling, and alteration of existing buildings. Site grading and improvement and architect fees are also included. Federal funds may be used for up to one-half of the eligible cost. Public Law 88-210, Section 4 (a) (5) and Section 8 (2) should be consulted for additional information.

   b. Matching requirements and purposes

      When the regulations for the new act are finalized, careful study should be made of those sections relating to amounts required, sources of matching funds, basis for matching, and matching purposes. Interested educators making such studies should be able to obtain information that will enable them to achieve maximum use of local and state funds for matching purposes in agricultural technology programs.

PART IV

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